United States Coast Guard

Systems Times

Winter 2005

DEEPWATER

U.S. Coast Guard Systems Times

Working Today to Challenge Tomorrow

U. S. Coast Guard Systems Times

COMDTPUB P5700.2

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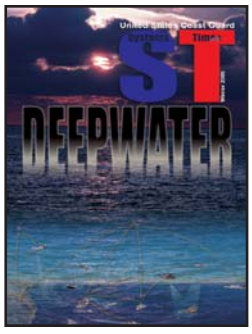
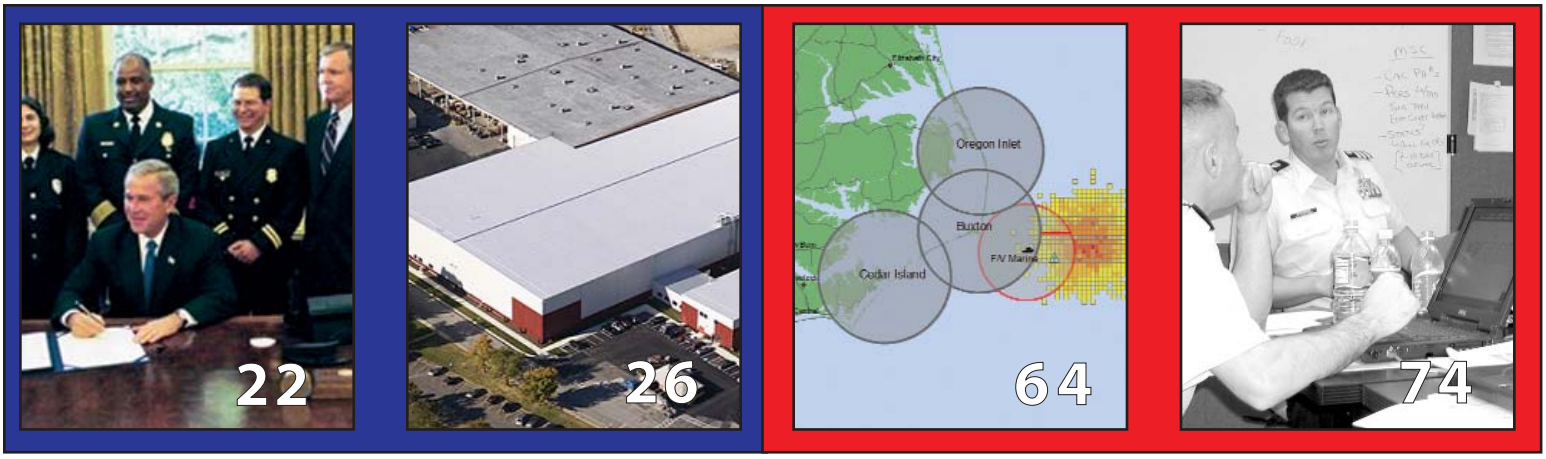
Submission deadlines are as follows:

Spring 2005 - 03 January 2005
Summer 2005 - 01 April 2005
Fall 2005 - 01 July 2005
Winter 2006 - 03 October 2005



***On the Cover:** Deepwater is the Coast Guard 's major initiative to update its platforms and systems.* *See page 14 for a Deepwater update.*



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Correction: The Loran station pictured on the front cover of the Fall 2004 issue was identified as being in Alaska; however, the 625' tower and transmitter building is in fact Lorsta Jan Mayen, Norway. Pictured is the "new" transmitter building, housing a Megapulse solid-state transmitter and timing racks. The station is located in the North Atlantic, 71N 8.30'W, on a small, volcanic island, with a 18-person crew.

From the Chief Engineer

Welcome to the Winter 2005 issue of the *Systems Times*. In previous issues of the *Systems Times* we have focused on our various support entities including ELC, ARSC, MLCs, and the Yard among others. We have also highlighted Command, Control, Communications, Computer and Information Technology's (C4&IT) significant and influential contributions to the Coast Guard's current and future operations. In this issue, we continue to highlight those systems and entities that profoundly impact our legacy of performance excellence, with a particular focus on how the future is likely to impact Systems and its support infrastructure.

The Coast Guard is immersed in a tide of change that is challenging our operational units and our people in new and different ways everyday. The relentless press of time, increased optempo and challenging legacy sustainment budgets has stressed our aging infrastructure of ships, aircraft and shore facilities. In typical Coast Guard fashion, we have adapted to new mission priorities, embraced changing maintenance philosophies and adopted new and innovative management practices. Clearly, it is this strong foundation upon which we will build our future.

To continue the proud legacy of "superior operational performance through engineering excellence," Coast Guard

Engineering continues to look for ways to provide superior service by providing the right products, at the right place, for the right cost. Finding innovative ways to reduce costs through efficiencies gained in operations, support and staffing is a direction the Commandant desires us to actively pursue.

To paraphrase Darwin regarding survival: "it doesn't belong to the strongest, it belongs to those most adaptable to change." Adapting to the new world of work is today's foremost challenge. How well we adapt to this change and how well we manage this change will be crucial to our collective operational and support success. Nurturing both individual and organizational intellect and forging relationships with our partners and customers are fundamental guidelines I want you to pursue.

In these *Systems Times* articles you will gain insight into how the field continues to adapt to provide top-notch support to legacy assets, while remaining focused on our Coast Guard of the future. Support infrastructure has leveraged rapidly changing technology to improve crew safety and training, overhaul and maintain assets both new and old alike, and improve operational capability while simultaneously bringing new Sectors and EMSSTs online. These articles provide a view into how our adaptive engineers and logisticians design, refine, and improve our support systems and infrastructure to sustain the highest levels of operational readiness. Supporting new ideas, new units and sustaining our legacy assets will be both challenging and opportunity-rich.

Our ability to adapt to our changing environment will constantly challenge the very soul of our support existence. I know that we are up to that challenge…this issue of *Systems Times* is rife with evidence of that. So, I challenge each of you to continue to find new and better ways of providing the superior support that our Coast Guard has grown to expect from its engineers.

In closing, I want to thank you for your hard work, your dedication, your relentless pursuit of service excellence and for your passion and vigilance.

Erroll M. Brown RADM, USCG
Assistant Commandant for Systems
"Chief Engineer"

Nationwide/Maritime Differential Global Positioning System (N/DGPS) (C2CEN)

The Nationwide Differential GPS (N/DGPS) expansion project continues to increase signal coverage throughout the U.S.. Thirty NDGPS sites are now on air supplementing the existing Maritime DGPS sites for a total of 87 transmitting broadcast sites. Eighty-seven percent of the country is receiving at least one DGPS signal and fifty five percent of the country is receiving at least two DGPS signals. Recently, the Bakersfield, California; Austin, Nevada; Topeka, Kansas; and Seneca, Oregon, U.S. Air Force Ground Wave Emergency Network (GWEN) sites were converted to NDGPS operations. The Topeka site replaces the older Kansas City Army Corps of Engineers DGPS site. Construction is finished on a new NDGPS site in Greensboro, North Carolina. The upcoming months will show the same steady progress as additional sites are brought on-air. These include new construction sites in St. Mary's, West Virginia; Dandridge, Tennessee; and Idaho Falls, Idaho, as well as GWEN conversions in Klamath Falls, Oregon and Milwaukee, Wisconsin, to replace a maritime site located nearby. Nearly 95% of the continental U.S. will be covered by at least one NDGPS signal once these efforts are completed. The present NDGPS predicted coverage map is shown in Figure 1 and the proposed Fiscal Year 2005 predicted coverage map is shown in Figure 2 with single coverage areas in gray and double coverage areas in yellow.

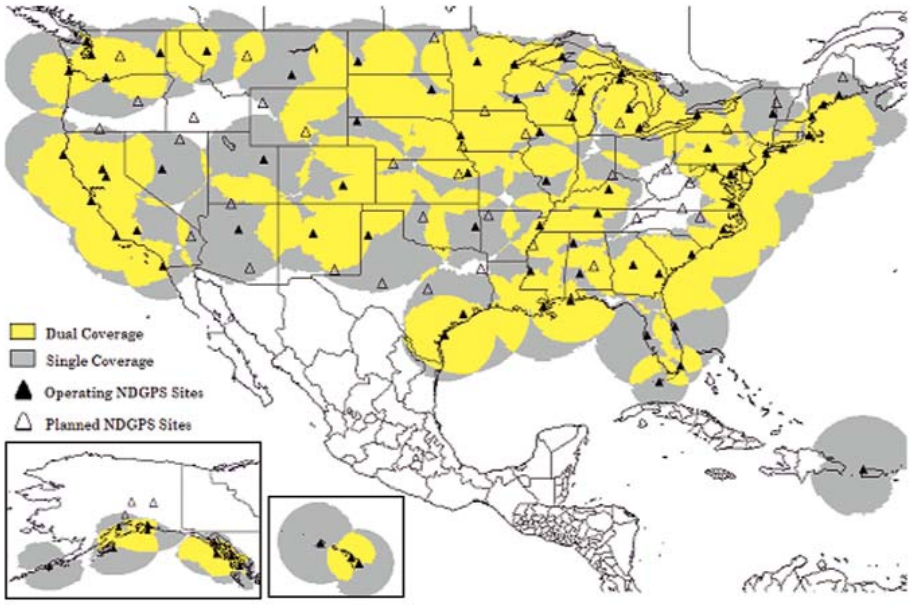

Figure 1. SEPT 2004 PREDICTED NDGPS COVERAGE (Courtesy USCG NAVCEN).

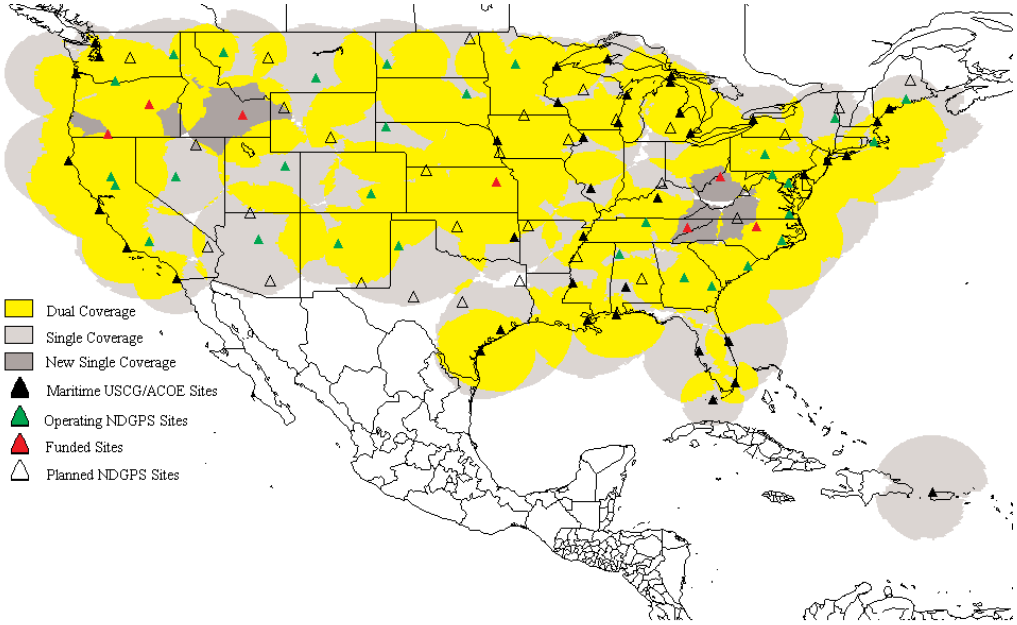

Figure 2. FY2005 PREDICTED NDGPS COVERAGE (Courtesy USCG NAVCEN).

USCG C2CEN (Command and Control Engineering Center) continues to work with equipment manufacturers and field units to implement several recently issued Field/Engineering Changes (FC/EC) to improve the overall availability and reliability of the N/DGPS service. These changes include EC1, which introduces a new back-up battery charging system to the maritime DGPS

sites; and FC18, which removes the legacy battery charging system from the SC-1000 transmitter. Recommendations have been forwarded to the Maintenance and Logistic Commands (MLC) on both coasts to upgrade the maritime DGPS MF antennae to enhanced configurations that will provide improved operability in foul weather.

Several major N/DGPS system engineering changes are in the works at C2CEN, including the replacement of the automatic tuning units at all DGPS maritime sites; the replacement of the Z-12 DGPS Reference Stations and 4000IM DGPS Integrity monitors with PC based platforms at all N/DGPS site; the reengineering of the SC-1000 DGPS MF transmitter; the replacement of the GPS antennae at all sites; improvements to decrease susceptibility to lighting/icing outages; and upgrades to the Nationwide Control Station (NCS) and associated system network.

N/DGPS Point of Contact is Mr. David Wolfe at (757) 686-4015.

Electronic Charting System Replacement (C2CEN)

The Command and Control Engineering Center (C2CEN) is replacing the current Electronic Charting System (ECS), CAP'N Voyager, throughout the Coast Guard. This replacement will support installation of the Automated Identification System (AIS), provide a capability to support additional official chart database types, and allow the export of Western Rivers Short Range Aids (SRA) data to the Army Corps of Engineers (ACOE).

Safety of Life at Sea (SOLAS) regulations require vessels to carry AIS. AIS is a VHF transponder that broadcasts three types of information: dynamic (position, course, speed), static (MMSI (Maritime Mobile Service Identity), name, length, beam, antenna position) and voyage (cargo, destination, draft). Other mariners with AIS equipment on board receive this information while concurrently transmitting their own. The U.S. Coast Guard will meet the SOLAS regulations by installing AIS equipment on all cutters. Standard AIS equipment, however, displays its information on a Minimum Key Display (MKD). The MKD does not allow the operator to easily view AIS data. The solution to this problem is to input the AIS information to the ECS and display AIS contacts directly on the chart. The ECS allows the operator to query a selected target to get its static information, and it can be used to transmit and receive text messages (such as maneuvering arrangements) via the AIS.

The new ECS will also allow the use of multiple chart data types. The Coast Guard's requirement for the new ECS includes all of the official chart databases currently allowed by the Cutter Navigation Standards. These include Electronic Navigational Charts (ENCs) produced by NOAA (National Oceanic and Atmospheric Administration); Digital Nautical Charts (DNCs) produced by NGA (National Geospatial-Intelligence Agency); Raster Navigational Charts (RNC's) produced by Maptech in BSB format; and RNCs produced in the Admiralty Raster Chart Service (ARCS). In addition to meeting the Cutter Navigation Standards, the expanded chart capability will provide coverage for regions routinely patrolled by the Coast Guard but not currently covered by ENCs, including the Caribbean and South American coasts.

The ECS replacement project will also provide a new data capture function for a joint Coast Guard-ACOE project to produce Inland Electronic Navigation Charts (IENCs) for the Western Rivers. The floating Short Range Aids to Navigation on the Western Rivers are not currently captured via ATON databases. Western River tenders (WLRs) will be able to capture basic information (position, type, river stage, river gauge, etc.) about the aids they service and export the data to the ACOE. The ACOE will use the ATON data in updates to the IENCs. This provides both the commercial and recreational mariner with a more detailed chart, with the intent of providing safer navigation.

This project is still in the early stages. C2CEN anticipates awarding a contract for the new ECS software in Fiscal Year 2005, with installations starting as early as summer 2005. For further information contact the C2CEN Project Officer, LT Scott Woolsey, at (757) 686-2158.

USCGC MACKINAW Construction Update (G-SEN-2)

The construction of USCGC MACKINAW (WLBB-30), the multi-purpose Great Lakes Icebreaker (GLIB), is ongoing at Marinette Marine Corporation. It is scheduled to be launched on 19 March 2005, with a delivery date of 15 October 2005. The MACKI-

NAW will be supported through several multi-year support contracts. These support contracts will cover all major systems (propulsion, electrical distribution, prime movers, Machinery Plant Control and Monitoring System and the Integrated Bridge System) providing the MACKINAW with contracted support for annual equipment grooms, preventative and corrective maintenance, supply support, configuration management, 24/7 technical support and training. Naval Engineering Support Unit (NESU) and Electronic Systems Support Unit (ESU) support personnel will be stationed in the ship's homeport to provide contract administration for these large multi-year support contracts. These support contracts will allow the MACKINAW to be optimally manned in a remote homeport (Cheboygan, MI) with no Maintenance Augmentation Team (MAT) support. G-SEN- 2 (Office of Naval Engineering) Point of Contact is LT Chris Wolfe at (202) 267-2242 (cwolfe@comdt.uscg.mil).

A stern view of MACKINAW: The double chine will improve icebreaking astern. Also visible are the holes through which the Azipods will be mounted.

USN PC-179 Patrol Coastal Ships (G-SEN)

The U.S. Navy (USN) will conduct a four-year lease transfer of five PC-179 Patrol Coastal ships during Fiscal Year 2005 (FY05). The first four ships, MONSOON (WPC-4), ZEPHYR (WPC-8), SHAMAL (WPC-13) and TORNADO (WPC-14), were transferred to the U.S. Coast Guard (USCG) on 1 October 2004, and the fifth ship, TEMPEST (PC-2), will be transferred during calendar year 2005. A unique maintenance sharing arrangement has been implemented, whereby the USN will retain life-cycle manager support responsibilities for the WPCs, including the planning, execution and funding of intermediate and depot level maintenance, as well as managing the casualty correction process, through FY08. The USCG will maintain the ships using existing USN maintenance practices, and will fund the costs associated with organizational level maintenance. USN Port Engineers and Life-Cycle Managers will take the place of traditional USCG Port Engineers and Type Desk Managers, while USCG Maintenance Augmentation Team and Electronic Systems Support

Detachment personnel will take the place of existing USN Maintenance Support Teams. Two USCG Maintenance Coordinator billets have been established to coordinate maintenance efforts between USCG and USN commands. LCDR Bob Hendry, G-SEN.

Knowledge Management

by CDR Martin Oard
Coast Guard Yard

I. The Coast Guard Knowledge Gulf

If only we knew what we know, the title of O'Dell and Grayson's 1998 landmark guide to Knowledge Management (KM), is the lament of many a Coast Guard Systems engineer. Every field engineer has struggled while trouble shooting a main propulsion system, radar or other difficult casualty. Additionally, we all intuitively know that someone else out there has probably had the same problem or a very similar one. Unfortunately, we often do not know who that person is, and there is no easy way to find out. A technical representative from the manufacturer of one piece of equipment in the system is of little help because the problem could be anywhere. If we are lucky, we might know someone from a school we attended or on the cutter berthed across the pier with more experience than us. In addition to this dilemma is the fact that the average time in grade, for enlisted Coast Guard Systems personnel, has dropped precipitously in the past ten years As you can see, the forecast is not optimistic.

So, what can be done to traverse this gulf of knowledge? Many commercial companies have embraced a competitive strategy centered on KM to assist them with improving their products, services and factory or field operations. Actively managing organizational knowledge is not an easy or simple undertaking. In fact, according to Szulanski and Winter (2002), only 12% of senior company management feel that they are making the best use of the knowledge within their organization, even after they implemented KM programs. However, few have given up their determination to improve the use of knowledge in their company. To be successful, an organization needs focus and commitment from senior leaders to market KM to the rank and file employees and implement successful pilot programs. Only clear, continued commitment from top management will ensure that the proper organizational culture is fostered and that the project planning, implementation, expansion and integration phases of knowledge management are executed effectively.

This report provides a thorough overview of what knowledge is, how to best transfer it and how to implement KM from a Coast Guard perspective. I believe that KM can have a significant positive impact on Coast Guard Operations. When you finish reading this report, I know you will understand why I believe this.

II. What Knowledge Is

First, it is important that the term "knowledge" be defined generally in terms of what it can mean to an organization. O'Dell and Grayson (1998, p. 5) define knowledge as "information in action." Kikawada and Holtshouse (2001, p. 291) state that "Knowledge is the accumulated

experience and actionable information that exists within an organization. It is information in action or the capacity to take action." Nonaka, in his pioneering paper on knowledge management, stated that knowledge often results in innovation, and innovation starts with one person. However, it is of little value until it is distributed across an organization (Nonaka, 1991, p. 3). It is important to understand where knowledge is typically located within a company. In one study, it was determined that on average 12% of a company knowledge was stored on databases, 46% was on paper and electronic documents, and the remaining 42% was located in the collective minds of the employees (Kikawanda & Holtshouse, 2001).

It is widely recognized throughout the KM field that there are essentially two specific types of knowledge, explicit and tacit. Explicit knowledge is known as "formal" or "coded" knowledge. It is easy or already written down. This makes it easy to transfer. On the other hand, tacit knowledge is known as "informal" or "uncoded" knowledge. It is much more difficult to explain or write down (O'Dell and Grayson, 1998, p. 3). To articulate tacit knowledge, poetic or expressive language or symbols are often used (Nonaka, 1991). Story telling, because it is often expressive and emotional, is another effective way to transmit tacit knowledge (Brown and Buguid, 2000). As you will see below, being able to express and thus transfer tacit knowledge is a key component in organizational learning, which is what KM is all about.

While tacit and explicit knowledge are clearly different, it is at the intersection of the two that learning occurs. Learning, difficult things in particular, is usually a social process. Takeuchi states that "human knowledge is created and expanded via the social interaction between tacit and explicit knowledge." He further labels the possible interactions as follows: "tacit to tacit ... socialization; tacit to explicit -- externalization; explicit to explicit - combination; explicit to tacit -- internalization" (Takeuchi, 2001, p. 322). A real world example of how these interactions happen would be as follows. Tacit to tacit could be when an experienced electrician shows another electrician how he approaches isolating problems in a complex propulsion system. Tacit to explicit would be when the experienced electrician writes down his or her approach using if then statements, flow charts or check lists. Explicit to explicit is when the written approach is integrated into technical publications and/or course books. Explicit to tacit is when the other technicians who use the technical publication or course material absorb the technique and style behind this troubleshooting approach and use it when working on other equipment. Lapre and Wan Wassenhove made similar observations about learning in a manufacturing plant, but express it from a different perspective. They noted that only when employees experienced both "conceptual" (understood the basic science or cause and effect relationship) and "operational learning" (implemented a successful real environment solution) were they able to successfully express the solution explicitly, duplicate it elsewhere in the plant, and reuse the tacit knowledge to find solutions to different problems with some similarities (Lapre and Wan Wassenhove, 2002, p. 3).

III. Best Practices and Barriers to Knowledge Transfer

The most well recognized approaches to KM is the transfer of best practice. One of the reasons why the transfer of best practice is so intuitive or widely understood is that this is how we learn from our parents growing up (O'Dell and Grayson, 1998). It is important to recognize that there may be more than one best practice within an organization in a specific area. Therefore, it is important that an organization have an accepted and effective process for determining what is best (Brown and Buguid, 2000). There are three cautions or concerns with respect to the use of best practice. The first concern is over optimism. People under estimate the difficulty of replicating best practice in complex areas. The second concern is whether or not a particular best practice be replicated? Sometimes an exceptional manager or team are the reason for success. If either of these is the case it may not be cost effective to replicate the best practice. Third, there is always a temptation to add on or alter an existing best practice with the well intended goal of making it better. More often than not, these changes lead to failure (Szulanski and Winter, 2002). Despite these pitfalls, replication of best practice has been highly successful in many organizations.

In addition to the transfer of best practices concerns, there are roadblocks, which inhibit the transfer of knowledge, that need to be reviewed. On the personal side there are four road blocks: not being aware that the knowledge needed exists; not having the time, tools or money to find it; not having a relationship with the person who has the knowledge; not having the incentive to get or provide the information. On the organizational side, the following roadblocks exist: vertical or stove pipe company organizations; "not invented here" attitude; "by the book company" (personnel will not do anything that is not officially sanctioned); "Babel CO" (activities are so far flung that there are no common practices); "bolt it on CO" (were an organization expects to add a knowledge portal as the only requirement to manage knowledge) (O'Dell and Grayson, 1998, p. 18).

IV. What Knowledge Management is Not

Where does knowledge management fit in relative to some other management systems? In particular, how can it be reconciled with the reengineering and total quality management initiatives that organizations are using? Reengineering is a system that creates a process oriented organization, and Total Quality Management (TQM) is

the system that champions the use of teams and measurement (O'Dell and Grayson, 1998). Additionally, according to Brown and Buguid (2000, p. 2), "reengineering is about the structured coordination of people and information," is "top-down," and assumes both that it is "easy to codify value creation," and a "predictable environment." They describe knowledge management as assuming that "value-creating activities are not easy to pin down" and that there is an "unpredictable environment." What they recommend is a balance between the two (KM and reengineering or TQM). In other words, an organization needs both innovation and the ability to execute in the work place. KM will create the innovation and reengineering or TQM will enable a company to implement it.

V. The Coast Guard and Knowledge Management

What does the Coast Guard need to do to successfully set up its own KM system? It is important to understand that knowledge should not be collected randomly or universally. The knowledge we select should have a purpose or a focus. It is universally agreed by KM practitioners that every organization needs to establish a "value proposition." O'Dell and Grayson, list three possible value propositions: "customer intimacy" (marketing, sales and customer service); "Product-to-market excellence" (product development and time to market); and "operational excellence" (manufacturing and field operations). Of these three, "operation excellence" is the best fit for the Coast Guard. The "value proposition" ensures that an organization target areas where it needs to improve the most. It is important to note that the specifics of a value proposition can change with time (O'Dell and Grayson, 1998, p. 22-23).

Second, according to O'Dell and Grayson, there are four enablers to KM: culture, technology, infrastructure and measurement. The right culture means an organization needs to cultivate personnel who have pride in the organization, are honest, have excellent team skills and have a common process for improvement (Baldridge criteria). The key issue, with respect to technology, is knowing its limits and not depending on what it cannot accomplish. Infrastructure is the need to embed in an organization the policy, processes and entities that support capturing and sharing the desired knowledge. Measurement is the way in which the effect of KM is validated, which will ensure that the necessary resources continue to be committed (O'Dell and Grayson, 1998).

Finally, there are specific steps necessary to move from being an organization that does not manage knowledge well to one that does. In 1998 O'Dell and Grayson detailed a four step process: "Plan" (self assessment); "Design" (roles and functions for people, technology, infrastructure, measures); "Implement" (targeted pilot programs); and "Scale up" (targeting additional areas for KM throughout the organization) (O'Dell and Grayson, 1998, p. 26). The current American Productivity & Quality Center (APQC) Web site, has refined O'Dell and Grayson's original four steps into five steps. These steps are: "Get Started," "Develop a Strategy," "Design and Launch a KM Initiative," "Expand and Support," and "Institutionalize Knowledge Management" (APQC, 2003, p. 1). These steps will be detailed in section VI.

Why should the Coast Guard focus on "operational excellence"? Generically, organizations that focus on "operational excellence" look to lower the cost of delivering operations through increased productivity and raising performance. The most popular way to accomplish this is the identification and duplication of an organization's "best practices." As you can see, these concepts match up well with what we strive to achieve every day in the Coast Guard. For example, one Coast Guard goal is to deliver operationally capable ships to different locations for varying periods of time. As part of this process, we are concerned both with costs, which we always seemed constrained bye, and lost cutters days, which we seek to minimize. We also strive to minimize the number of cutter days in which category 3 and 4 casualties exist. These and other measures should be monitored for change when KM is implemented to improve operational performance in this area (O'Dell and Grayson, 1998, p. 32). In the commercial sector, British Petroleum was able to reduce its drilling days per well from 100 to 42 days through the use of best practices (Nonaka and Teece, 2001). In the late 1990s, I was lucky enough to participate as the Maintenance and Logistic Command Atlantic (vr-1) representative in the Paragon Project at LANTAREA. This project was essentially a one-time attempt to gather and select best practices for 210 foot WMECs [Medium Endurance Cutters]. Everyone I knew, that was associated with this project, felt it a worthwhile endeavor that provided great value to the organization. If the Coast Guard chooses to implement KM, projects similar to Paragon would likely be permanently embedded in its organizational structure. However, this time the Coast Guard should take advantage of better guidance from organizations like APQC and make better use of technology tools.

I believe that Coast Guard personnel by their very nature have the desire to share. There is no doubt that our core values (Honor, Respect and Devotion to Duty) are a big step in the right direction when it comes to developing a culture of sharing. However, many of the roadblocks noted earlier do exist. Specifically, our people are not aware of knowledge when it exists, they do not have the tools to retrieve it, there are no specific incentives for them to look for or share knowledge, and they often do

not have the time to look for it. To resolve these problems, senior Coast Guard leadership will have to convince employees that sharing is critical to the organization by setting the example, restructuring the organization to facilitate KM, providing mechanisms that ensure personal accountability and recognition for sharing, and creating a collective urgency with respect to the Coast Guard value proposition (O'Dell and Grayson, 1998).

Information Technology (IT) is a key enabler of KM. It facilitates access to knowledge in many different ways and can reduce the cost of and accelerate sharing. However, too great a focus on IT can also be a problem for two reasons. First, employees can become overwhelmed by too much information or too complex a system. Second, there may be an IT system and knowledge mismatch. If knowledge is more complex or tacit, a less complex IT solution is required. In this case, the IT system is usually being used by one person to locate another person, who can assist them. If knowledge is less complex, the IT solution is more complex. In this case library cataloging and sophisticated databases are generally utilized (O'Dell and Grayson, 1998). Both O'Dell and Grayson (1998) and the APQC (2003) Web site provide excellent overviews of specific types of IT applications and their uses with respect to KM. Some of these IT tools are document and discussion databases, directories of expertise, document exchanges (e-mail) and video teleconferences (O'Dell, Elliot, & Hubert, 2000). Some of the keys to creating a successful IT infrastructure are educating the IT department on KM and the transfer of "best practices;" developing a system for classifying knowledge so that it can be searched; properly matching applications to user requirements; adapting IT systems to how they are being utilized; and doing what works, vice trying to achieve an ideal. It is critical to keep in mind that KM is primarily a people oriented social behavior. Therefore, IT should facilitate interaction or substitute for it (O'Dell and Grayson, 1998). A detailed study of three different industries (health care; consulting firms and computers manufactures) provides important clues on what type of IT solutions will fit different situations. If an organization is selling common products or services, it is best for it to pursue codified databases for KM support. If customized solutions or product innovation are sought, IT solutions that enhance person-to-person interaction are best (Hansen and Nohria, 1999).

According to O'Dell and Grayson, "infrastructure" is the "technology, work process and networks of people." As discussed above, IT systems are established to facilitate knowledge sharing. It is critical for an organization to insert KM into work processes to ensure knowledge is captured and cataloged, and personnel are rewarded or held accountable. Networks of people, which are commonly known KM as "communities of practice" need to be

established, and the methods for enabling the interaction of geographically isolated communities of practice need to be established (O'Dell and Grayson, 1998, p. 107). Communities of practice are often set up based on "technical or functional specialties" (Kontzer, 2003, p. 2). KM organizational "infrastructure" generally falls into one of three general categories "self directed," "knowledge services and networks" and "facilitated transfer." "Self directed" infrastructure involves providing personnel with tools for storing, sharing and organizing knowledge, but little else. It is the cheapest, but least effect method of KM infrastructure. "Knowledge services and networks" involves "information services, help desks, networks of personnel, discussion databases, communities of practice and knowledge managers." It is more expensive and more effective. "Facilitated transfer" involves everything mentioned in the previous sentence and "full or part time staff" to facilitate KM. It is the most expensive and effective of the three (O'Dell and Grayson, 1998, p. 110-113). Nonaka stated that "redundancy" was the key to being successful with KM. It provides the time for people to communicate and learn. This in turn leads to a higher level of knowledge among all employees. He also stated that "when responsibilities are shared, information proliferates, and the organization's ability to create and implement concepts is accelerated" (Nonaka, 1991, p. 7). The APQC emphasizes that there is no one solution that fits all situations. It is important to fit the application to the situation (O'Dell, Elliot, & Hubert, 2000). A hallmark of KM is the increased independence of the lowest level entities (usually teams) in an organization. For example, a study of the New South Wales State Mail Service found that top management continued to provide broad guidance and require measures, which directed organizational achievement. However, it was the two sets of working level teams, which were coordinated through a group of facilitators and supported by an advisory group, that drove the organization along the path to success (Mir & Rahaman, 2003).

Measurement, as mentioned previously, is the key to proving the value that KM is providing the organization. As we select areas in the Coast Guard to use KM, like the example noted above in the paragraph on "operational excellence," it should become obvious what measures will provide us an indication of whether KM is providing the organization value or not. Some generic areas that should be looked at for measuring are process or cycle time, process success rates or timeliness and expense versus accomplishment. Measures, whether they are objective or subjective, will indicate to us what the "cost of not knowing" really is (O'Dell and Grayson, 1998, p. 127-129). The APQC believes it important to measure behavior and attitude toward KM in the beginning to ensure the crucial organizational culture and commitment battles are won. Once these measures are satisfactory, the shift should be to measures that relate directly to the "value proposition" (O'Dell, Elliot, & Hubert, 2000). It is important to recognize that a healthy disagreement exists in the KM community with respect to the importance of measurement. One side of the debate argues that learning should be "sharing enabled." They believe that sharing drives innovation, which in turn will drive improvement. The opposing side is the "results-oriented" group. They believe that establishment of a value proposition by top management should determine where to focus KM resources (Lucier & Torsilieri, 2001, p. 241-242). Both cases have their merits. I believe that the "sharing enabled" approach is better suited toward organizations that are focus on new product development or research and development, and that the "results-oriented" approach is better for operations oriented organizations.

VI. Stepping toward Knowledge Management

According to the APQC, "Get Started (Stage 1)" encompasses: educating the organization of KM; finding people who already share knowledge well and recruiting their support; identifying opportunities to apply KM; and enlisting the assistance of the IT department to help educate the organization and acquire tools to assist with sharing. Once an organization's senior leadership is engaged in Stage 1, a value proposition can be determined and used to identify KM opportunities (APQC, 2003, p. 1).

"Develop Strategy (Stage 2)" involves: establishment of a multi-disciplinary team to seek places for piloting KM to improve performance; selecting several targets for pilots; and searching for funding and personnel to implement the pilots (APQC, 2003, p. 1). Funding for KM pilots is typically found in two locations. The organizational section targeted and the IT department (O'Dell and Grayson, 1998). This is not surprising given the IT department's role in KM and that the organizational section targeted is the one that will benefit from it. The APQC's rule of thumb with respect to KM project funding is that approximately one third of all costs are IT related. The cautionary note being that if you are spending more than one third of KM funding on IT, you are probably spending too much (O'Dell, Elliot, & Hubert, 2000).

"Design and launch KM Initiatives (Stage 3)" includes: funding of pilot initiatives; developing the processes for capturing, organizing and transferring knowledge; and capturing best practices (APQC, 2003, p. 1).

"Expand and Support (Stage 4)" consists of: establishing a plan to expand the pilots to other parts of the organization; "communicating and marketing the strategy"; and "manage growth" by controlling the chaos that is part of large scale change to an organization (APQC, 2003, p. 1).

"Institutionalize Knowledge Management (Stage 5)" involves: implanting KM throughout the business plan; altering organizational structure and funding to ensure KM is supported; measuring vibrancy of KM; ensuring organizational evaluations and incentives encourage KM; and ensuring work groups have the independence to develop KM sources that they need (APQC, 2003, p. 1). The goal at this stage is to make knowledge sharing and transfer routine, a part of daily process (O'Dell and Grayson, 1998). This is often accomplish two different ways. The first or "integrated" method is to require documentation prior to proceeding to the next step. The second or "semi-integrated" method is to add knowledge sharing steps to a process (O'Dell, Elliot, & Hubert, 2000, p. 22).

VII. Conclusion

Knowledge management can greatly reduce many of the knowledge gap problems the Coast Guard is experiencing. Implementing KM will not be a simple task. Formalized training, rating courses and unit on the job training will continue to play an important part in our organization. However, KM will ensure that the content of these traditional learning modes are the best the organization has to offer. KM would also have the same affect on many of the policy documents that govern our organization. The next step is to educate your peers and subordinates on the value of sharing their knowledge, and encouraging them to do so frequently. The key to improving Coast Guard operations lies in getting the right knowledge as quickly as possible to the people who need it, and knowledge management is the path.

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Systems

Welcome to DEEPWATER

Engineering:

Designing Deepwater's System of Systems

by **Mark D. Gaspar and Gordon I. Peterson**

The Integrated Deepwater System's (IDS) recapitalization of the Coast Guard's aging inventory of cutters, aircraft and supporting systems is remarkable in many respects, but its overarching construct as a system of systems promises to improve the effectiveness of Coast Guard operations at an affordable cost in ways that are not fully appreciated today.

"When Deepwater is complete," said Coast Guard Commandant ADM Thomas H. Collins, "our cutters and aircraft will no longer operate as independent platforms with only limited awareness of what surrounds them in the maritime domain.

ADM Collins continued, "Instead, they will have the benefit of receiving information from a wide array of mission-capable platforms and sensors-enabling them to share a common operating picture as part of a network-centric force operating in tandem with other cutters, boats, and both manned aircraft and unmanned aerial vehicles."

The Deepwater system of systems is a collection of different elements that together produce results not obtainable by the individual elements alone. These include platform systems (aircraft, cutters and patrol boats), subsystems (radars, radios, satellite communications, etc.), as well as individual components and assets (people, hardware, software, shore facilities).

All elements combine to generate capabilities needed to produce system-wide results. The value added by the system as a whole, beyond that contributed independently by its individual elements, is created by the integration among the elements (i.e., how they are interconnected and combined in order to work together).

The Commandant recently described the Deepwater Program as the "future of the Coast Guard" in a recent "ALCOAST" message. "Keeping Deepwater on track is one of my highest priorities," he said. In this regard, systems engineering plays a critical role in achieving the Commandant's goals. It is the foundation for the design, development and deployment of the Deepwater system of systems -- a Coast Guard-industry team effort, with the Coast Guard first defining operational environments and system-wide performance objectives.

It then falls to Deepwater's partner in industry and systems integrator, Integrated Coast Guard Systems (ICGS, a joint venture between Lockheed Martin and Northrop Grumman), to apply a systems-engineering approach to meet those objectives.

The result will be a transformation of today's Coast Guard to a 21st-century force employing more capable platforms, sensors and systems -- a force able to sustain operational readiness at needed levels and to implement the Coast Guard's maritime strategy and acquire maritime domain awareness more effectively at an affordable cost.

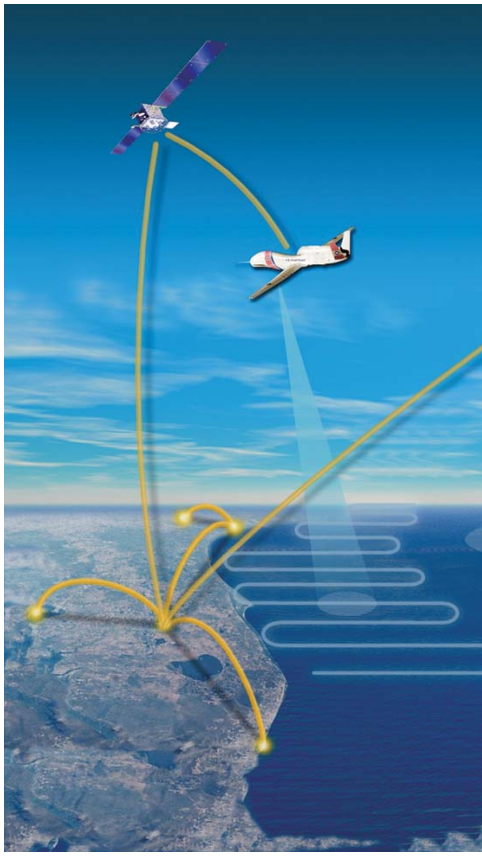
Momentum is Growing

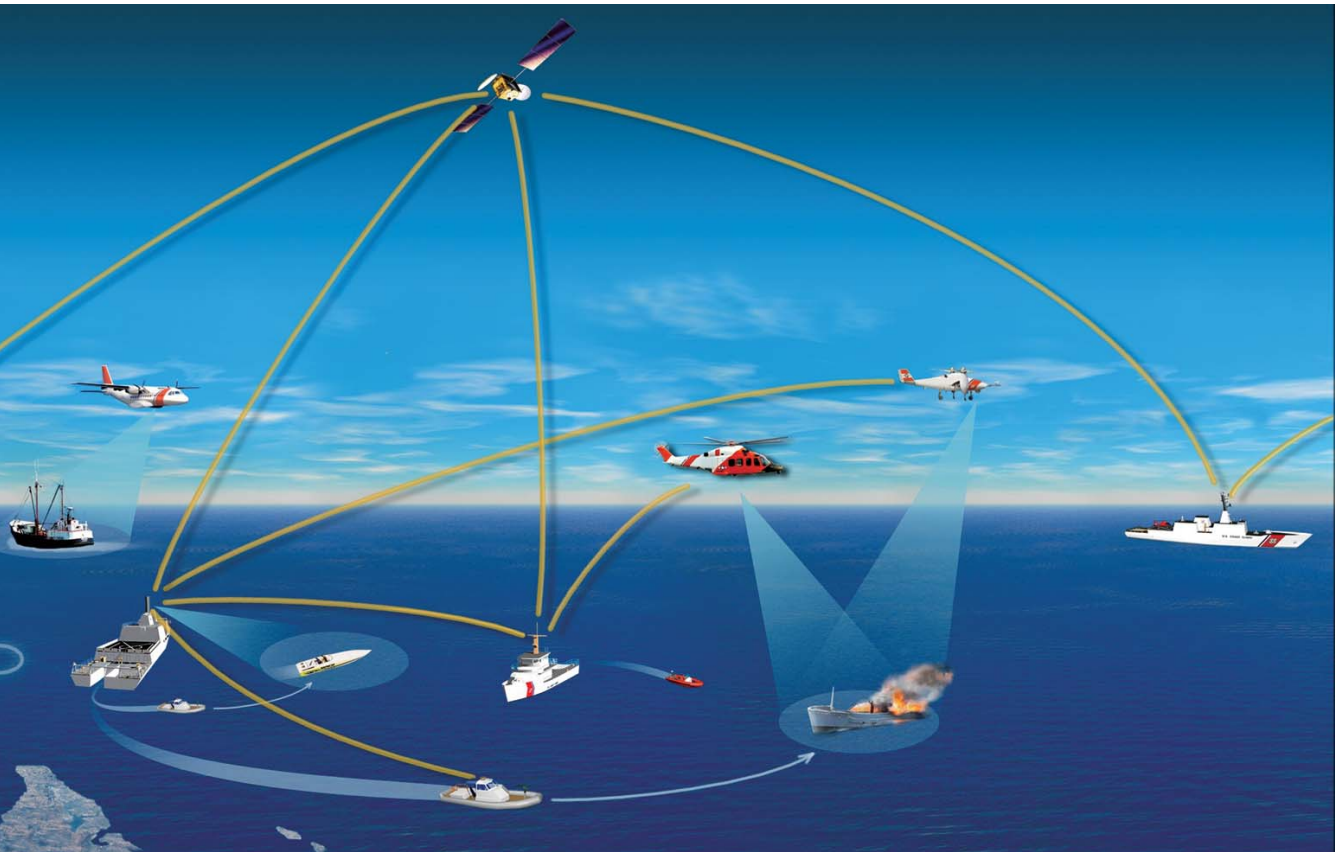
Conceived during the late 1990s to recapitalize an aging and increasingly obsolete inventory of cutters and aircraft, the Deepwater Program has assumed an even greater sense of urgency since 9/11. Deepwater's three new classes of more capable cutters and associated small boats, manned and unmanned aircraft, integrated logistics and an improved system for C4ISR (command, control, communications, computers, intelligence, surveillance and reconnaissance) will result in a vastly more capable and effective Coast Guard -- a force better able to safeguard maritime security in U.S. ports, coastal waters and open ocean.

As ADM Collins said earlier this year, "With 9/11 came the imperative to identify and reduce security gaps in the maritime. It is essential that we get this right -- the maritime sector is one of the most valuable and vulnerable components of our transportation system."

The multiyear Deepwater Program, formally launched more than two years ago with a contract awarded to ICGS, has gained added momentum in recent months. In June [2004], the Coast Guard awarded contracts for two of the Deepwater Program's three new cutters. The first contract began the design and final requirements work for the Maritime Security Cutter, Medium (WMSM, formerly known as the Offshore Patrol Cutter). The contract will advance the medium-sized cutter's original 2012 planned delivery schedule by a full three years.

Four days later, a contract totaling $140 million also was awarded to ICGS for the production and delivery of the first Maritime Security Cutter, Large (WMSL, formerly known as the National Security Cutter). Fabrication of the first-in-class of Deepwater's largest cutter began in early September [2004] at Northrop





A multifaceted systems-engineering approach guides the design, development, and implementation of the Deepwater Program's system-of-systems acquisition strategy. USCG/RICH DOYLE

With Northrop Grumman Ship Systems burner specialist Paul Bosarge (second from left) assisting, Deepwater's Coast Guard-industry team marked the first cut of steel for the Maritime Security Cutter, Large at the Northrop Grumman Ship Systems shipyard in Pascagoula, Miss., in September 2004. Shown here from left are: RADM Patrick M. Stillman, program executive officer for the Integrated Deepwater System; Paul Bosarge; Dr.Philip A. Dur, president, Northrop Grumman Ship Systems; and Fred Moosally, president, Lockheed Martin Maritime Systems and Sensors. NGSS

Grumman Ship System's shipyard in Pascagoula, Mississippi -- the first major multimission cutter to be introduced to the Coast Guard in the past 25 years.

Deepwater's recapitalization of the Coast Guard's cutter and aircraft inventory also calls for modernizing existing assets and sustaining a mixed force of medium- and long-range maritime patrol aircraft composed of the CASA CN235-300M and upgraded HC-130H/J search-and-surveillance aircraft, respectively.

Re-engining of the HH-65 Dolphin helicopter inventory began earlier this year [2004] to remedy chronic engine reliability problems. ICGS successfully conducted initial flight tests of the first re-engined HH-65C at the Coast Guard's Aircraft Repair and Supply Center in Elizabeth City, North Carolina on August 27. Coast Guard and industry test pilots were impressed with the aircraft's increased power, speed and maneuverability.

The first HH-65C helicopter re-engined under the Deepwater Program, shown here before repainting, successfully completed its first test flight in August. ICGS

The Integrated Deepwater System will deploy both modernized and new manned and unmanned aviation platforms, including the Eagle Eye tiltrotor vertical takeoff-and-landing unmanned aerial vehicle, shown here in an industry mock-up. Bell Helicopter

A Force Multiplier

In the context of maritime homeland security, particularly in ports and coastal areas, one of Deepwater's most significant capability enhancements will be its robust C4ISR system. It is a fundamental building block in improving the Coast Guard's ability to maintain Maritime Domain Awareness (MDA) focused on meeting the needs of decision makers engaged in operations at sea, ashore and in the air.

The network-wide system is

being designed to ensure the Coast Guard will possess and maintain seamless interoperability with the forces and agencies of the Department of Homeland Security, the Department of Defense (DoD), and other federal and regional agencies -- a true force multiplier in the fullest sense.

This critical element in Deepwater's system of systems network also has marked several important milestones. Last year, the Coast Guard cutter USCGC NORTHLAND received the first in a series of enhancements and communication-systems upgrades for 270-foot medium endurance legacy cutters.

NORTHLAND and the Coast Guard's 12 other medium-endurance cutters now boast improved performance within existing communications systems and additional access to a variety of intelligence and data sources previously unavailable. Enhanced capabilities now provide these cutters access to classified and unclassified data communications through international maritime Satellite B services connectivity to the DoD Secret Internet Protocol Network (SIPRNET).

Additional future enhancements include doubling the data bandwidth and improving variable bandwidth efficiency, improvements that will enable cutters to exchange and process information more rapidly. Similar upgrades to the Coast Guard's inventory of twelve 378-foot high endurance cutters and fourteen 210-foot medium endurance cutters will close out this aspect of Deepwater's C4ISR modernization effort to bridge the gap until new platforms enter service.

These upgrades were performed in conjunction with similar Deepwater C4ISR modernization ashore. The first shore-based Deepwater communications upgrade was completed in September of 2003 at Communications Area Master Station Atlantic (CAMSLANT). The Communications Area Master Station Pacific (CAMSPAC) facility at Point Reyes, California, which supports the Coast Guard's Pacific assets, also received the same upgrade in early 2004. Such installations form the cornerstone for enabling enhanced operational effectiveness for the Coast Guard's legacy fleet even as new IDS platforms with more capable C4ISR systems are designed for the future.

Operational Analysis

It would be impossible to translate the Deepwater Program from vision to reality without relying on a disciplined approach to its systems engineering.

In the view of Program Executive Officer RADM Patrick M. Stillman, Deepwater's systems-engineering strategy must, of necessity, encompass multiple dimensions -- an interdisciplinary process for developing, optimizing, implementing and maintaining an incredibly complex system in a way that is cost efficient, reduces risk, and makes schedule commitments for cost and delivery more reliable.

"Deepwater's systems engineering is a multifaceted process aimed at achieving cradle-to-grave excellence across the life of our system of systems -- from the conceptual design of Deepwater platforms and supporting systems to their eventual disposition at the end of their service lives," he said. This iterative, spiral progression is focused squarely on stakeholders' needs -- to establish mission and capability requirements using objective measures and desired outcomes; to identify, analyze and implement alternative solutions; and to achieve dramatic improvements in system interoperability and efficiency.

The critical component of the ICGS approach is operational analysis of the effectiveness of varied force structures, tactics, procedures, techniques and combinations of C4ISR systems. Modeling and simulation tools allow ICGS systems engineers to determine the optimum force configuration to meet the Coast Guard's performance goals, operational requirements and cost constraints.

Extensive studies examined all Coast Guard mission areas -- including maritime security, safety and mobility, national defense and protection of natural resources. These studies produced today's planned Deepwater system of systems of platforms, C4ISR and integrated logistics -- a system tailored to the Coast Guard's five principal regions (Northeast, Southeast, Western, Alaska and International).

This complex analysis takes into account detailed operational modeling of platforms and systems, optimized force mixes of varying size, asset applications using various concepts of operation and timed incremental implementations across the life of the program.

Deepwater's new platforms, like the Maritime Security Cutter, Large, will benefit from the application of spiral-development design principles in acquisition planning, a key aspect of Deepwater's systems-engineering process. NGSS

A Structured Approach

ICGS adheres to a structured, systems engineering approach to evaluate alternative system designs and conduct related studies. This process identifies optimum solutions balancing total ownership cost (for procurement, integration, operations, maintenance, technology refreshment and personnel), operational effectiveness (system performance for threat negation, incidence prevention or reduction and interoperability) and sustainability (training, maintenance, logistics, procedures and obsolescence).

The multifaceted system engineering process entails performance evaluations across the system, subsystem and component levels to analyze products and capabilities for both interoperability and system synergy to allow engineers to predict total system performance for numerous configurations (e.g., types and capabilities of assets, numbers of platforms, C4ISR architecture, etc.) and scenarios.

The ICGS team also applies an orderly systematic analysis to C4ISR development and integration that is open to various solutions in a "best-of-breed" approach.

Numerous modeling and simulation tools are integrated to allow comparison of the overall performance of the Deepwater system of systems to that of today's legacy force.

The integration of various Coast Guard legacy platforms and systems presents a highly complex challenge in system design. Initial Deepwater implementation, as well as subsequent upgrades and enhancements, must be addressed even as current operations continue at a high tempo and new missions evolve.

The Coast Guard-ICGS approach to systems engineering ensures that the Deepwater system of systems model retains the flexibility to be adapted to changing circumstances -- like the accelerated modernization of legacy platforms experiencing unacceptably high system failures- or changes in requirements. The wisdom of this methodology was validated most recently with the Coast Guard's completion of a "performance-gap analysis" addressing post-9/11 requirements.

Pathway to the Future

Since 9/11, the Coast Guard's mission demands, threats and operational priorities have changed considerably -- including a 40 percent increase in resource usage and an exponential expansion of homeland security requirements. A comprehensive analysis of the Coast Guard's post-9/11 operational capability and capacity gaps in today's homeland-security environment documents a compelling need to revise the Deepwater Implementation Plan to address these circumstances and to align the program with the Department of Homeland Security's strategic goals. The Coast Guard recommendations to revise the Deepwater Implementation Plan to address today's requirements will be proposed to the Department of Homeland Security as part of the Fiscal Year 2006 budget process.

Because of this need to remain flexible and responsive over the life of the program, the Deepwater system engineering strategy relies on spiral development to respond to evolving technology or changes in mission requirements.

Spiral development establishes requirements in an iterative process, by partitioning capabilities that can be defined, developed, refined and matured without causing rippling dependencies among other capabilities. The spiral process encourages in-stream improvement and refinement that allows system developers to upgrade capabilities incrementally until the system fully meets customer expectations.

Each spiral can accommodate successive iterations of requirements development and solutions testing, starting from broad aspects and progressing (i.e., spiraling) toward more specific aspects.

Customer feedback from Coast Guard operators -- in the form of cutter patrol summaries, Area-commander assessments and technical-performance measures -- will continue to be used to assess system performance as it evolves.

For Deepwater, reevaluation is an essential part of the spiral-development process so that changing needs, missions and new technology can be incorporated into the system of systems over the life of the program. Unlike many major acquisition efforts, the Coast Guard has designed and is implementing a program that will result in unprecedented levels of capability at costs lower than could be achieved using a "one-asset-at-a-time" recapitalization approach.

In today's complex, interconnected world, sound systems engineering is the pathway to the Coast Guard's future -- the means that will enable the Deepwater network-centric, system of systems to serve as a model for other major acquisition programs for many years to come.

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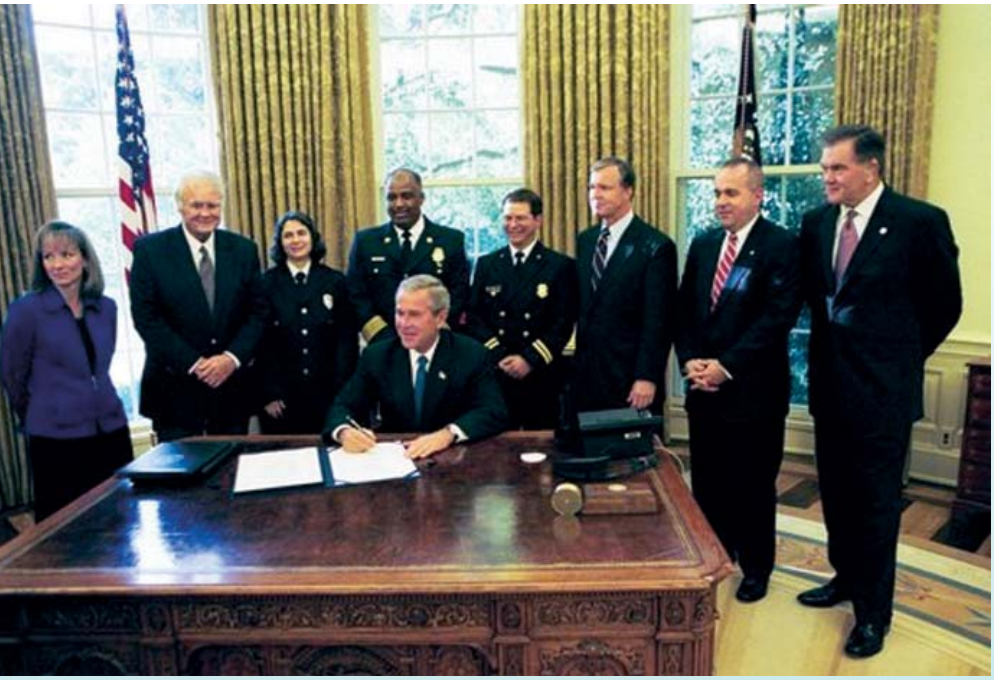


President Signs Homeland Security Appropriations Bill

Commandant Highlights Deepwater Program in ALCOAST Message

by Gordon I. Peterson
Deepwater

President Bush signed the Department of Homeland Security Appropriations Act for Fiscal Year (FY) 2005 into law on October 18 during a morning ceremony in the Oval Office. The President said the bill, which provides a 6.6 percent increase in net discretionary spending for homeland security over last year's level, represents a "… strong law that will make the nation more secure."

"Our first duty in the war on terror is to protect the homeland," Bush said during a speech in Marlton, New Jersey, later in the day. The appropriations bill provides $28.9 billion in net discretionary spending for the Department of Homeland Security, a $1.8 billion increase over 2004 and a $14.9 billion increase (106%) over 2001 levels.

Ridge, "Our Common Purpose"

Secretary of Homeland Security Tom Ridge echoed the President's emphasis on protecting the homeland during a speech to Ohio law-enforcement agencies on October 15. "The attacks on our country three years ago changed everything for all of us, and yet, in some ways, changed nothing at all," Ridge said. "Amid extraordinary challenges, our determination, our courage, and our common purpose remain steadfast."

The new appropriations bill provides $6.3 billion for the Coast Guard for FY 2005, an 8.6 percent ($500 million) increase over

Photo above: President Bush signs the Department of Homeland Security Appropriations Act for Fiscal Year 2005 at a ceremony in the Oval Office in October; the funding bill includes $724 million for the Coast Guard's Integrated Deepwater System. White House Photo

2004, and a 66 percent ($2.5 billion) increase over 2001 levels. As part of funding for Coast Guard programs, the appropriations bill includes $724 million for the Deepwater multi-year acquisition to modernize and recapitalize the Coast Guard's inventory of cutters, aircraft and supporting systems.

The $724 million congressional appropriation for Deepwater is $46 million more than the President's request of $678 million and $56 million above the FY 2004 appropriation of $668 million. "We recognize and greatly appreciate the strong support demonstrated by the Department of Homeland Security, the administration, and the Congress in advancing Deepwater's urgently needed recapitalization of the Coast Guard," said RADM Patrick M. Stillman, Deepwater's Program Executive Officer.

The appropriation will fund critical Deepwater Program initiatives to develop network-centric C4ISR (command, control, communications, computers, intelligence, surveillance and reconnaissance), continue development of integrated logistics support, recapitalize the Coast Guard's aging inventory of obsolete cutters and aircraft, and modernize aging legacy assets until new platforms enter service in future years. "The Deepwater Program is the future of the Coast Guard," said ADM Thomas H. Collins, Commandant of the Coast Guard, recently.

Deepwater Gaining Momentum

In an "ALCOAST" message to the Coast Guard on September 28, ADM Collins reaffirmed his guidance and focus on Deepwater's trackline. "Bringing Deepwater's system-of-systems acquisition to life is an extraordinary challenge," he said. Despite the continuing threat to mission performance presented by aging aircraft, boats, and cutters, the Commandant explained how the Deepwater Program is gaining momentum in a number of important ways.

"We have commenced immediate re-engining of HH-65 helicopters, accelerated the maritime patrol coastal (WPC, formerly the fast response cutter) to replace existing deteriorating Island-class patrol boats, expedited C4ISR upgrades to selected legacy cutters, and moved ahead smartly with the design of the maritime security cutter, medium (WMSM, formerly the offshore patrol cutter), the platform slated to replace our medium endurance cutter fleet," Collins said.

In recent months, the first re-engined HH-65C helicopter completed successful flight testing, a contract was awarded to Integrated Coast Guard Systems (ICGS) to begin preliminary design and final-requirements work on the WMSM with the goal of advancing the cutter's launch by three years, and fabrication of the maritime security cutter, large (WMSL, formerly the national security cutter) began in early September 2004.

"In just a few years," the Commandant said, "the Coast Guard will accept delivery of its first new 21st-century cutters. The sooner we get more reliable, more interconnected assets, the sooner they contribute to restoring and improving operational readiness and capacity commensurate with our critical mission set."

Coast Guard Delivers First Re-Engined HH-65 Helicopter

by PAC Jeff Murphy
Integrated Deepwater System

The Coast Guard, in partnership with Integrated Coast Guard Systems (ICGS) team (a joint venture between Lockheed Martin and Northrop Grumman), successfully delivered the first re-engined HH-65C "Dolphin" helicopter on October 7th to Aviation Training Center, Mobile, Alabama. The helicopter's initial development, design, and flight-testing took place at the Coast Guard's Aircraft Repair and Supply Center (ARSC) in Elizabeth City, North Carolina. This is the first Coast Guard production aircraft to receive a new system under the Integrated Deepwater System Program.

During the past seven years, Coast Guard aircrews reported more than 80 mishap reports concerning in-flight engine failures on board HH-65 helicopters. Although necessary steps were taken to address immediate concerns and correct many of the problems, the safety-of-flight issue required a Coast Guard-wide overhaul of the fleet workhorse.

In compliance with identified system-performance specifications developed earlier this year, the Coast Guard requested ICGS take immediate and definitive action to re-engine the HH-65 fleet, a feat achieved in 111 working days from the start of work to flight operations. The conversion of an HH-65B helicopter to HH-65C helicopter will require an estimated three months.

Currently, ARSC personnel are in the process of re-engining and modifying all 95 Coast Guard HH-65 helicopters into "C" model helicopters. As HH65A aircraft enter Periodic Depot Maintenance at ARSC, they will be converted from HH-65A into an HH-65C. This process will also incorporate all HH-65B upgrades currently being implemented. Additionally, all HH-65B aircraft currently in the fleet will undergo a modification process to upgrade it to an HH-65C.

This first production HH-65 helicopter incorporating Deepwater upgrades entered full operational service at Aviation Training Center, Mobile, Alabama, in early October. Modification of the first ready-response HH-65 will be completed in early December 2004, and it will be assigned to HH-65 prime unit, in Atlantic City, New Jersey, which serves as the operational center for new maintenance procedures and testing development.

The modernization effort includes the provisioning of kits to re-engine the twin-engine helicopters with the more powerful Turbomeca Arriel 2C2-CG engine. Enhancements include optimized heat shields beneath the exhaust system and installation of a reconfigured control panel featuring a digital fuel control system conversion.

In addition to the new digital electronic engine control system, other upgrades include beefed-up gearboxes, tone-emitting warning systems (vice lights-only), and simplified instruments. The physical appearance of the Dolphin remains the same with the addition of a protective heat shield beneath the exhaust stack of the engine and an extended nose with a larger battery. Inside, the aircraft's main instrument console has been simplified.

The Deepwater Program's HH-65 helicopter modernization effort at Coast Guard's Aircraft Repair and Supply Center in Elizabeth City, NC, includes the re-engining of the twin-engine helicopter with the Turbomeca Arriel 2C2-CG engine and numerous other upgrades. Photo by PAC Jeff Murphy, USCG

The transition from earlier model helicopters to HH-65C helicopter will require a two-week training syllabus with both ground and flight sessions. Training courses are planned for maintenance mechanics in the operation and repair of this new system. The Dolphin's flight simulator at Aviation Training Center (ATC) Mobile and the Maintenance Training Unit at ATC Elizabeth City are also scheduled for update.

An Emphasis on People

ADM Collins also emphasized in his recent Coast Guard-wide message on the Deepwater Program that the Coast Guard will ensure that it has the right level of manning and support systems in place to maximize Deepwater's operational effectiveness while minimizing total ownership costs. "The one system we must absolutely get right is the people piece," he said.

The Commandant encouraged officers in command at all levels to continue to provide Deepwater's Program Sponsor's Office at Coast Guard Headquarters with data and recommendations relating to emerging operational and personnel trends. Such inputs are captured regularly through screening of cutter patrol summaries and regular program teleconferences and visits with both the Atlantic and Pacific Area Commanders.

"Keep the flow of ideas from the deckplates coming," said ADM Collins. "Your ideas can be reflected in new requirements that will work their way through an established requirements-change process that enables deliberate review at the highest levels."

The current review of the Coast Guard's proposed budget for Fiscal Year (FY) 2006 will play an important role in determining the Deepwater Program's future scope and implementation.

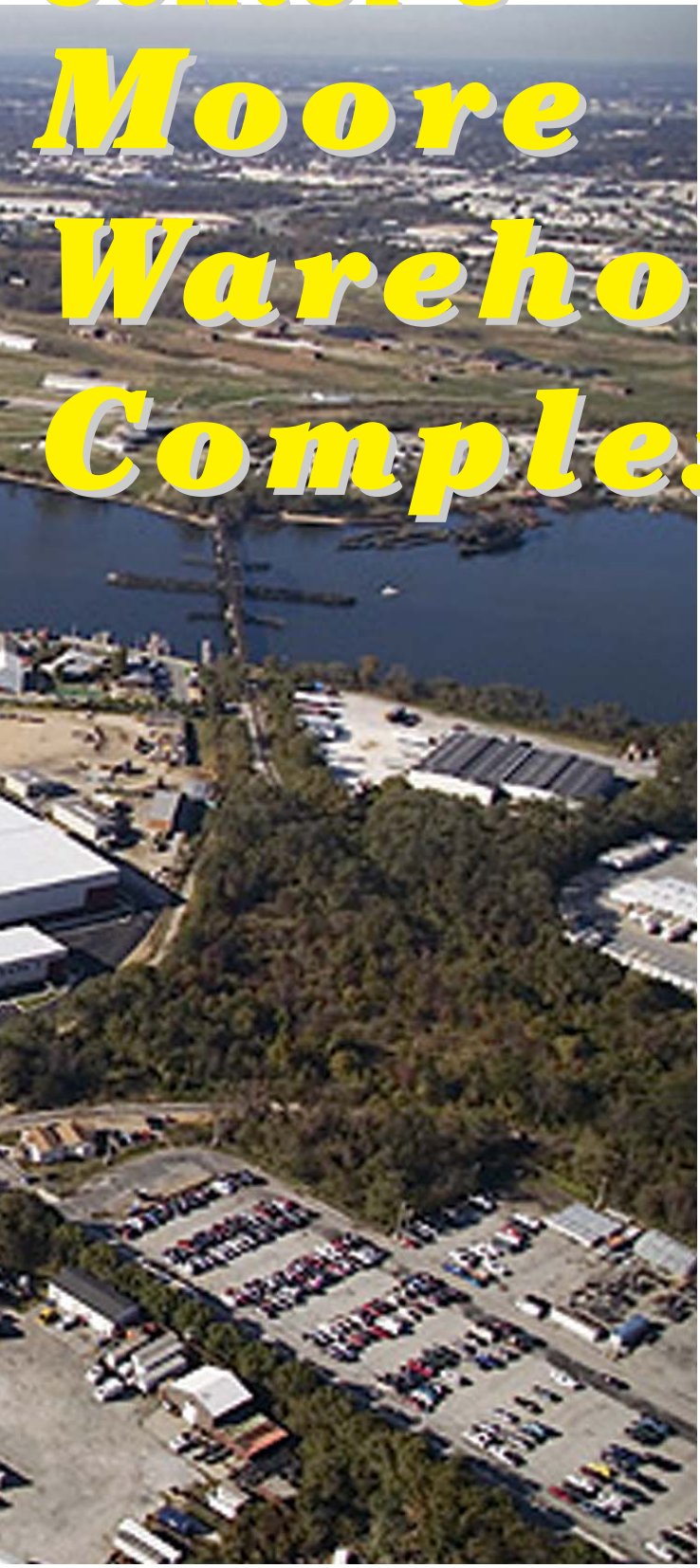
Following a performance-gap analysis and other assessments of the Coast Guard's post-9/11 requirements, a revised Deepwater mission need statement and implementation plan were finalized in recent months. They were proposed to the Department of Homeland Security in early October and, following approval by the department's Joint Requirements Council, submitted to the Office of Management and Budget in mid-October as part of the federal budget process for FY06.

"Our objective is to acquire needed, affordable capabilities to safeguard the security of the nation and safety of our citizens while being fully responsive to the needs of our people and mission requirements," ADM Collins said. "Keeping Deepwater on track is one of my highest priorities."

Engineering Logistics

Aerial view of the ELC.

Center's Moore Warehouse Complex



by Cathy Broussard, FDCCLANT,
Eric Tipping, FDCCLANT and
Steve Conner, Bucon, Inc.

Since its original founding in June 1899, the facilities and mission of the U.S. Coast Guard Yard, Curtis Bay, Maryland, has changed greatly. Although its primary function as shipbuilding, overhaul and repair center has remained through the years, it also served as the site for training facilities that eventually became the U.S. Coast Guard Academy. It was used as a boot camp during World War II, and more recently became the site of the Coast Guard Engineering Logistics Center (ELC) that serves as the Coast Guard's supply center for information, materials and parts for Coast Guard boats and vessels throughout the world.

As a result of the consolidation of the existing Curtis Bay Supply Center with the Brooklyn Supply Center, the ELC was commissioned on the 28th June 1996. The consolidation resulted in the ELC Material Management Branch having to meet supply storage needs by utilizing two existing converted World War II era barracks Buildings 85 and 86 and the infill Building 86D for low rack and bulk storage. An additional 175,000 square feet of high bay and rack warehouse space was leased in Columbia, Maryland for $1.7 million per year.

PROJECT BACKGROUND The initial consolidation Project Planning Report was for construction of 100,000 square feet of additional warehouse space adjacent to existing Buildings 85 and 86 to provide space for relocation of the storage at the Columbia Warehouse. Because it was inefficient to have leased space 23 miles away from the ELC in two separate warehouses, it was recommended that the warehouses be combined. Upon reexamination of the project scope, modifications were made to demolish Buildings 86 and 86D and part of Building 85 and construct a new high bay warehouse in their place. The Engineering Support Laboratory (ESL), relocated from the now closed Electronics Engineering Center (EECEN), Wildwood, New Jersey, in 1995, had to remain in operation due to its mission to provide electronic equipment components to the legacy fleet. ELC administrative functions, located in the south end of Building 86, would be relocated to temporary facilities during construction. Part (A) of the Project Proposal Report was approved in April 2000 for execution as a Fiscal Year (FY) 2002 Major Acquisition, Construction & Improvement (AC&I) construction project with a budget of $12.5 million.

ACQUISITION STRATEGY The Facilities Design and Construction Center Atlantic (FDCCLANT) in Norfolk, Virginia, is responsible for the design and construction of the new U.S. Coast Guard Engineering and Logistics Command's 130,400 square-foot warehouse and administrative office space. In order to expedite the construction process and to minimize the extension of existing property leases, a more aggressive non-traditional procurement action was necessary. The execution strategy chosen for this project was to use an existing General Services Administration Federal Supply Schedule (GSA FSS) in lieu of the traditional design, bid and build process. This allowed FDCCLANT to conduct market research on the potential GSA FSS contractors, and determine their interest in the project prior to funding authorization. We invited all FSS contractors to attend an on-site informational meeting in September 2000. This meeting allowed potential contractors to become familiar with existing warehouse conditions and proposed construction site; to visit the leased warehouse space; and to discuss proposed temporary facilities and other concerns. Contractors were asked to provide input on how they could streamline the project, recommend value engineering concepts, minimize impact on Coast Guard operations, improve building layout and avoid potential pitfalls. This preliminary exchange of information and fact finding served as FDCC's market research and scope development. Market research revealed only one FSS contractor was interested in a project of this scope, Bucon, Inc., headquartered in Kansas City, Missouri.

Because AC&I construction funds would not be available until FY2002, FDCCLANT proceeded with the development of conceptual plans, performance specifications and cost estimate for the project, through the use of an existing Architectural/Engineering Services indefinite quantity contract with Waller, Todd and Sadler of Virginia Beach, Virginia. The project's conceptual plan development was a joint effort by FDCCLANT, Yard Facilities Engineering, ELC Materials Management Branch, ELC Engineering Support Laboratory, Maintenance and Logistics Command Atlantic (MLC(A)) telecommunications staff and Engineering Support Division (ESD) Baltimore. Bucon, Inc. representatives were also involved to ensure that the conceptual design plan was in accordance with their pre-engineered building construction parameters. The conceptual plan development phase revealed that several aspects of the previous plan were not viable. The project scope was revised to include complete demolition of Buildings 81, 85, 86 and 86D, and 149; conversion of a storage area in Building 85D to a wood shop; and phased-in construction of a new 24,000 square-foot laboratory/administrative building. The plan also included the relocation of existing ESL and ELC administrative functions; followed by demolition of the existing buildings; and construction of a new 118,000 square-foot warehouse connected to the new laboratory/administration building.

DESIGN AND CONSTRUCTION Upon receipt of funding authority, Bucon, Inc. was requested to submit a proposal for the ELC warehouse consolidation project, based on the conceptual design plan and performance specifications. Successful negotiations were conducted and a contract was awarded for $10,928,000 on 4 June 2002, with a project completion date of 16 September 2003. This was the beginning of a strategic alliance between the various Coast Guard entities and Bucon, Inc. Maintaining the spirit of teaming, FDCC established meetings to track design progress, resolve design issues or changes, coordinate reviews and discussions with the ELC and the Yard, and determine overall project scheduling.

Moore Warehouse Complex.

Moore Warehouse dedication plaque.

Laying of the warehouse slab.

Meeting participants included FDCCLANT, Yard, ELC, ESL, ESD Baltimore, MLC(A) telecommunications staff, the on-site government inspector, Bucon, Inc. project manager, site superintendent, and their design and construction subcontractors. This forum was used to convey requirements, concerns and to openly discuss and resolve any issues affecting the project. Once the actual construction began, monthly progress meetings were held with FDCC, ELC Materials Management, Yard Facilities Engineering staff, Bucon, Inc. project manager and site superintendent. In addition, Bucon, Inc. held weekly on-site meetings with their subcontractors to review progress and to discuss and resolve problems.

The construction schedule identified that the project needed to be built in three phases to maximize the allotted construction days in the contract. The first phase included partial demolition of an existing building constructed in the early 1930s, and the construction of the new office/lab and a link to the proposed warehouse. Phase II included the demolition of one half of the old Buildings 86, 85 and 86D and construction of one half of the proposed warehouse. Phase III includes final demolition of the old buildings, construction of the balance of the new warehouse and a gatekeeper area.

Several challenges made this project unique and difficult to manage. Among the most critical activities included maintaining the utilities in the existing building while providing temporary and permanent utilities in the new building. Access had to be maintained to a relocated dock once the old warehouse was abandoned by the ELC. A new 10" water line had to be installed for the warehouse's ESFR sprinkler system. The water tap and developers agreement had to be in place before work on the water line could begin. This water line also had to be tunneled under CSX railroad tracks that operated 24/7, requiring permits and agreements. The Post Office and Police Station had to be operational as required and could not be interrupted by construction. Access to the buildings had to be maintained during their working hours. The move from the old building to the new building had to be coordinated with the support staff within the Logistics Management Branch and the ELC. Several ancillary buildings had to be relocated, including a battery storage building and the above ground fuel tanks. Temporary monitoring of the fuel had to be established until the office/lab were completed. A new fuel monitoring system was installed in the new office building when it was fully operational. Asbestos abatement in the old warehouse had to be contracted by the Coast Guard with an abatement contractor and coordinated by the general contractor.

PHASE I The first phase of construction consisted of establishing a new traffic control plan, installing temporary construction fence, occupation of the contractor lay down and storage areas, relocation of fuel tanks, establishing a new base maintenance contractor entrance and selective demolition of the old warehouse for new foundations to begin.

The plan was to shut down all utilities in the old buildings, except what would be needed for the office personnel and the existing lab to continue to operate, and cut a hole to establish a temporary shelter in the north side of Building 86. The demolition would allow construction of the Office, Lab and Link to start without interruption to ELC operations.

At this point the challenge was to maintain the schedule, which allowed for the Office and Lab to move in as planned. As construction was nearing the move date, the Office (2nd Floor) portion was nearing completion while the Lab lagged behind. It was decided to finish the second floor and let the Office move into the building first. The Lab would be completed after the Office had a chance to establish operations and begin functioning. The Lab would move at a later date, which would make both moves more efficient.

PHASE II During Phase 1 construction, the west half of the existing Buildings 86, 85 and 86D were demolished. Construction of the west half of the new facility began after the site was cut to grade. Early completion of the west half of the warehouse would allow the Coast Guard, an earlier than planned, opportunity to start installing the racking system. With racking installed and the completion of the warehouse in Phase III, there would be no lag in stocking material. The material would come from Columbia and stocked in the west half of the new facility. With the racking empty at Columbia, disassembly of empty racks could begin. The disassembled racks would then be relocated to the east half of the warehouse, completed in Phase III. Finally, material would be stored in the racks making the facility fully operational.

PHASE III After the Office and Lab had relocated, the asbestos abatement could begin in the last section of the old warehouse. The abatement had to be completed before demolition of the balance of the old buildings could be completed. Construction was not a challenge, the challenge was to complete the project on schedule. Phase III construction

Front row left to right: Captain Chris Mills, Cathy Broussard, Rear Admiral Erroll Brown, Captain Kevin Jarvis, and Commander Thomas Barone.
Back row left to right: Nelson Jeffers, Eric Tipping, Dave Alteri, and Michael Petryszak.

included a gatekeeper area with electrical and communication room supporting the warehouse. While Phase III was being completed, the Coast Guard began receiving and installing the racking in the west half of the warehouse on the defined traffic floors. Mutual cooperation contributed to timely problem resolution and the commitment to quality was evident in both the design and construction process.

Cooperation was essential during construction in order to maintain and minimize the impact on existing Yard and ELC operations. Coordination of work under other contracts and submission of permit approvals to other agencies was critical. All materials had to be removed and relocated from the to be demolished buildings to other facilities on the Yard and contract leased storage space before work could begin in the warehouse area, while existing utility services were relocated or rerouted to maintain operations. Temporary space was located for shipping and receiving functions during this phase. The existing fueling facility had to be relocated from the construction site to Building 20 while minimizing downtime. A separate contract for asbestos removal had to be coordinated with the ongoing demolition work and Civil Engineering Unit (CEU) Cleveland obtained approval from CSX for the new fire main to cross under their railroad tracks. Bucon, Inc. obtained a Developer's Agreement with the City of Baltimore for a tap to the main water line. In addition, this cooperation allowed the west end of existing buildings 85, 86 and 86D to be demolished and new warehouse construction to begin -- while the Coast Guard continued to occupy the east end of the buildings. This also allowed the Coast Guard to begin installation of equipment racks in the east end of the warehouse prior to construction completion.

CONCLUSION Overall, the GSA FSS contracting approach proved to be very successful for this project. Construction went smoothly for a project of this size and was delivered on-time and within budget. Modifications were limited -- largely due to customer needs that could not be identified until the design development process was underway. The new laboratory and administrative spaces provide considerable improvement over the previous facilities and include access flooring in the main laboratory. The warehouse area provides a state of the art storage facility for 35-foot high storage racks, electronic scanners and storage capacity for over 3 million pieces of inventory totaling $240 million. The successful completion of this project illustrates the importance of removing the barriers between the customer, contracting activity and contractor. Through constant communication, trust and the spirit of cooperation, this project was a huge success. This modern, state of the art facility allows inventory managers to provide the right part, at the right time, to the right place for the Coast Guard fleet. On 3 October 2003, this new facility was dedicated as the Moore Warehouse Complex -- in honor of LT John C. Moore. U.S. Congressman Benjamin Cardin of Maryland's Third Congressional District and Rear Admiral Erroll Brown, Assistant Commandant for Systems of the U.S. Coast Guard, cut the ribbon at the official dedication. ST

New Software for Updating Damage Control Documents

by Robert Sung
Peter Minnick and
Thomas Beukema

Because Damage Control documents are used to provide systems guidance in fighting damage resulting from fire, flooding, collision, grounding, explosion and war, it is imperative that the Naval Architecture Branch (ELC-023) of the Engineering Logistics Center continuously updates this documentation.

Damage Control Book (DC Book) - DC Books are ship-specific booklets that contain a detailed overview of a ship's Damage Control related systems and detailed cross-referenced listings of all compartment fittings.

Compartment Check-Off Lists (CCOLs) - CCOLs are ship-specific sheets that contain information about the exact location, purpose, and types of fittings and classification. All individual compartment CCOL sheets for a cutter can be collected and organized in booklet form.

Damage Control Diagrams (DC Diagrams) - DC Diagrams are ship-specific isometric diagrams depicting the layout of ship DC closures, piping systems and internal watertight boundaries. DC Diagrams are sometimes referred to as DC Plates.

In the event of damage, the ship's crew will rely heavily on these products to provide readily accessible information for the evaluation of existing damage and watertight integrity.

Due to the importance of these documents, all shipboard copies of DC Book, CCOLs and DC Diagrams require continuous maintenance to reflect current conditions aboard ship. These documents are routinely updated by ELC-023, Naval Architecture Branch. When DC Books are changed, the changes must also be reflected in the CCOLs and DC Diagrams. All three must reflect the same information.

Starting in Fiscal Year (FY) 2000, the Naval Architecture Branch undertook a project to update the software used to maintain damage control documents. The old software could no longer be supported. The updated software was a Windows® based program using a common database of information from which all three DC products extract information. This ensures new software agreement between products. The specialized software is comprised of two parts, AUTODAM and AUTOPLATE.

AUTODAM stands for AUTOmated DAMage Control Book. AUTOPLATE stands for AUTOmated Damage Control PLATEs. These programs are linked and provide a responsive and accurate means for updating DC Books, CCOLs and DC Diagrams for the Coast Guard cutters.

A ship-specific Damage Control database forms the central core of AUTODAM and AUTOPLATE wherein the basic text, compartment numbering and fitting classifications are maintained. Because it is a database, the information is cross-referenced so that once the DC Book information is entered, a CCOL is automatically generated using the data from the tabular section of the DC Book files and from the CCOL pages of the "Miscellaneous Unclassified Fittings List."

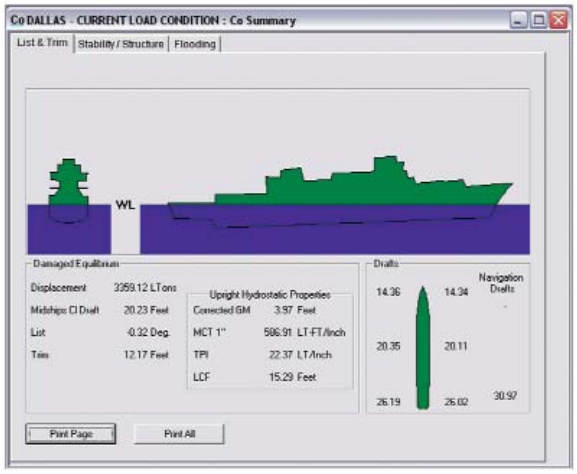
The AUTOPLATE program is used in conjunction with AutoCAD®. During the preparation of DC Diagrams, compartment numbering and fitting information is selected from the database and copied to the DC Diagram. For updating DC Diagrams, the program uses electronic confirmation of information to compare the DC Diagram with the database from the DC Book and publishes a list of differences. The correct information can then be entered on the DC Diagram.

The process of conversion to the new programs is nearly complete. The AUTODAM program is in use for all DC Books and CCOLs. AUTOPLATE is in the final testing phase. Once the two programs are fully integrated, the new process should ensure agreement of all compartment and fitting information between the DC Book, CCOLs and DC Diagrams.

ELC Launches FCCSWin Stability Software for SWIII

by Stefan Jurkiewicz

Ever since Noah loaded elephants on the lowest deck of the ark, it has been recognized that ship operators must determine and track the stability status of the ship. Today's ships are much more complicated, but the ELC sponsored Flooding Casualty Control Software for Windows® (FCCSWin) makes managing loads and calculating a cutter's stability quick and easy.



FCCSWin CO Summary Screen.

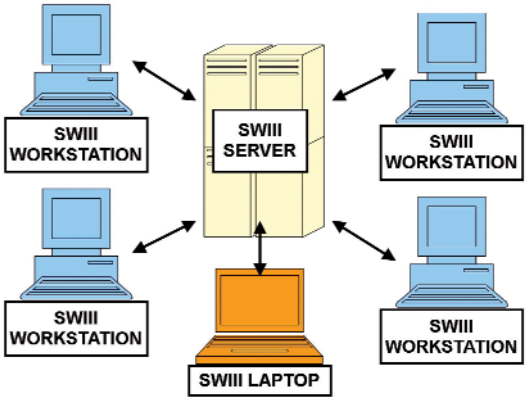
FCCSWin is a stability and load management tool designed for use by shipboard personnel. The software provides users with the ability to perform load management functions, quickly evaluate a ship's intact, flooded stability, and stability during grounding and drydocking operations. It can also be used to view and print stability diagrams for each applicable stability criteria, displays and prints the system's current hydrostatic properties, alerts the user to potentially dangerous situations and offers recommendations for improvement.

Additional FCCSWin modules under development include: Longitudinal Strength, Heavy Weather Guidance, Hull Structure Survival System (HSSS) and Intelligent Decision Aide (IDE).

FCCSWin was developed in a joint effort by ELC-023 and U.S. Navy. The DOS version was deployed on U.S. Coast Guard (USCG) cutters in 1995, and was converted to Microsoft Windows and greatly improved in 2000.

In December 2003, FCCSWin was approved for deployment on the USCG Standard Workstation III (SWIII). This milestone expands the software capability by making it accessible to authorized personnel from different workstations on the ship, while using existing hardware on the cutters.

FCCSWin was developed to operate in a client/server configuration on the SWIII, but it can be used in a stand-alone mode in case of casualty. The software is intended for installation on cutter's SWIII network on a number of workstations located throughout the ship, in areas where authorized personnel can access the program. At least one workstation is intended to be a laptop computer for dedicated use by the ship's EO/DCA, due to the laptop's capability to operate on battery power. A copy of the ship's FCCSWin database is maintained both on the local workstation and on the application server. In order to maintain the most current stability information on the laptop in case of network or power problem, the local and server based databases are synchronized every time the user starts and closes the program. Utilities are also provided to synchronize the databases manually.



FCCSWin Synchronization Method Illustration.

FCCSWin is the only computer program approved for stability evaluation on USCG cutters. Ship specific FCCSWin databases are available for all cutters 110 feet and larger. The Naval Architecture Branch (ELC-023) prepares, approves, updates, distributes and provides technical support for the FCCSWin program, ship specific FCCSWin databases (for cutters larger than 110 feet) and FCCSWin manuals. Support for 110 WPB (Patrol Boat) cutters is provided by the Boat Engineering Branch, ELC-024.

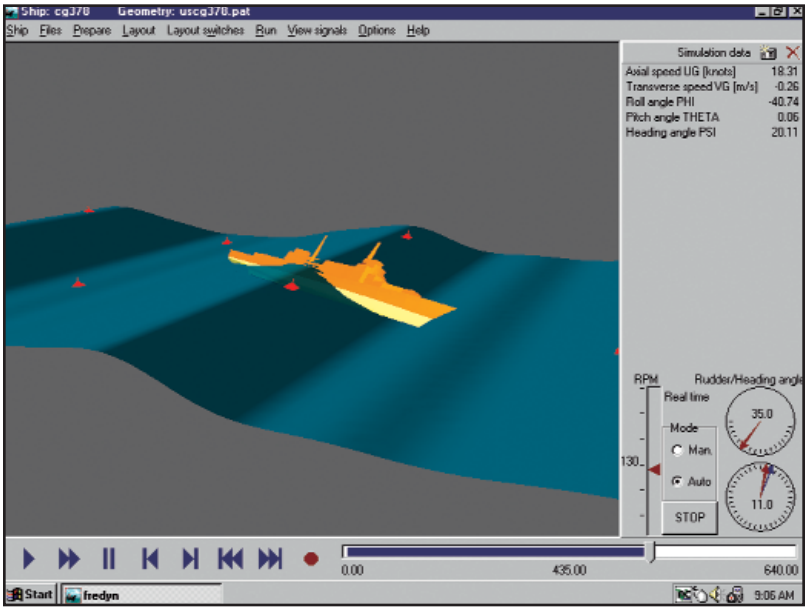
The ELC-023 has established an FCCSWin program web page to provide enhanced fleet support. A FCCSWin Program Installation Guide, program installer, program manual and ship specific FCCSWin databases can be downloaded from this site. The FCCSWin program web page can be accessed through the following link:

http://USCGweb.elcbalt.usUSCG.mil/fccs/index.htm.

Heavy Weather Guidance for Cutters

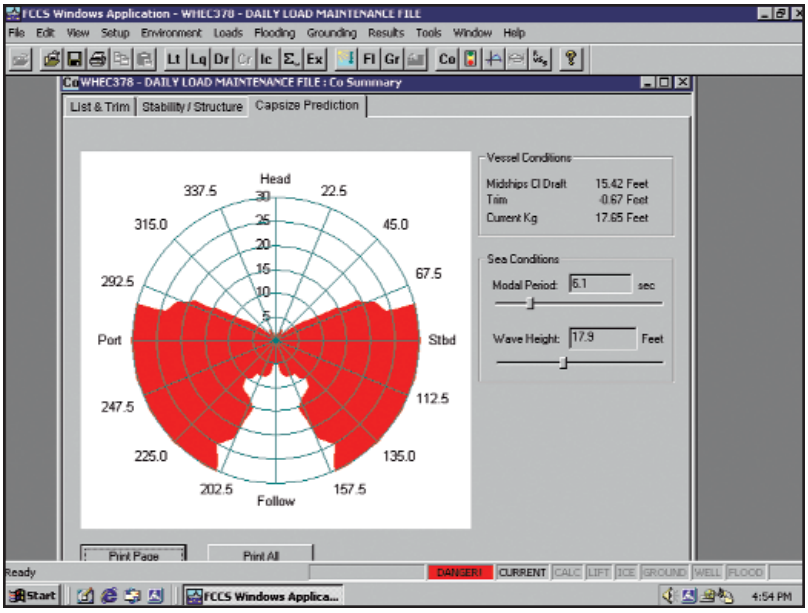
by Karl Stambaugh

The Naval Architecture Branch (ELC-023) is currently working on Heavy Weather Guidance (HWG) for ship operators. HWG will assist ship operators in the identification and avoidance of broaching, large amplitude rolling and other extreme ship motions that may lead to capsize. One approach in providing this valuable guidance is to predict extreme weather response and provide this information to ship operators and assist them in mission planning and real-time decision making at sea.



FREDYN simulation of response in extreme waves.

HWG Polar Plot in FCCS.



FREDYN is a time-domain computer simulation used to develop HWG for ships in extreme environments. ELC-023 participated in the development of this state-of-the-art program as a member of the Cooperative Research Navies Dynamic Stability working group, an internationally represented group. As part of the HWG development process, FREDYN is used ashore to generate a database of ship-class-specific dynamic response polar plots of potential extreme events including surfriding, broaching and capsize. Polar plots present data in graphic form for ship headings and a range of ship speeds. Real-time HWG is obtained by interpolating the database using significant wave height, wave period and ship loading conditions. The 378-ft WHEC (High Endurance Cutter) is being used for prototype development and demonstration of HWG.

Work is currently underway to integrate HWG into Flooding Casualty Control Software (FCCS) described earlier in this issue. A newly developed HWG module working within FCCS gathers the necessary loading condition information from FCCS. The user provides input of significant wave height and period for the seaway. The HWG module performs the necessary interpolation or extrapolation of the pre-computed dynamic stability responses for the cutter and displays the results in a polar plot.

Together with this effort, there is an investigation to incorporate modes of extreme response and appropriate avoidance action within the polar plots. For example, a ship operator should respond to a potential capsize situation via an appropriate shiphandling maneuver that depends upon the mode of capsize sought to be avoided. Interrogation of the polar plot (via mouse click or other means) by the ship operator will highlight the potential capsize mode and present recommended guidance to remove the vessel from the hazard with the greatest amount of safety. Ultimately, HWG will provide the operator with knowledge of extreme environmental conditions and ship loading conditions to avoid, thus enabling proactive planning and increased mission effectiveness. ST

ELC Contributes to NATO's Small Ship Design

by Christopher Cleary

The North Atlantic Treaty Organization (NATO) sponsors a number of Naval Armament Groups with the purpose of promoting defense cooperation and standardization through information exchange and multi-national activities. With the acceptance of Partner for Peace (PfP) nations into NATO in the late 1990s, the Naval Armament Group on Ship Design (NG/6) recognized the opportunity for PfP nations and NATO member nations to engage in a cooperative study of small military ships with missions of law enforcement, search and rescue, and littoral combat.

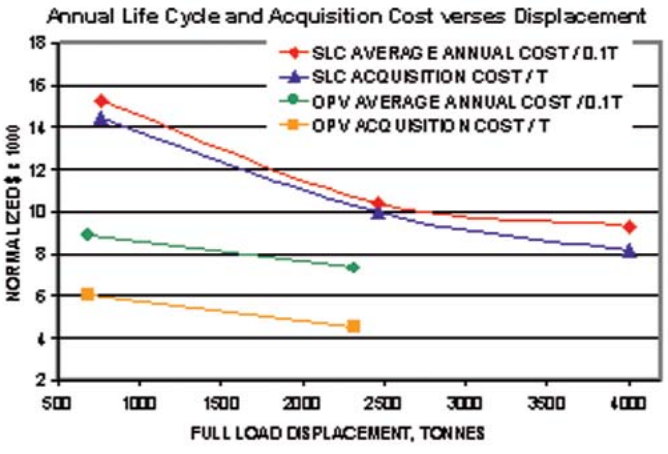
In June of 2001, a Specialist Team on Small Ship Design (ST-SSD) was chartered by NG/6 to produce a working paper on acceptable criteria, standards and specification for the design and construction of Small Littoral Combatants (SLCs) and Offshore Patrol Vessels (OPVs) with displacements of approximately 600 to 2000-tons. The Naval Architecture Branch of the United States Coast Guard, Engineering Logistics Center (ELC-023) was asked to chair this team because of the United States Coast Guard's long tradition of operating small offshore patrol vessels, and the branch's extensive knowledge in the design of these vessels. ELC-023 contributed significantly to the development of the working paper, which was recently approved for NATO publication.

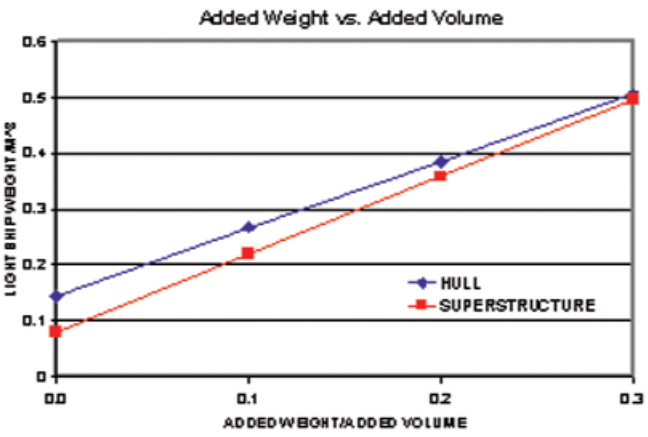
The purpose of chartering this team, beyond development of the working paper, was to stimulate new thinking in small ship acquisition, evaluate standardized formats for NATO ship specifications, and to attain and distribute new information on technology and materials suitable for small ships.

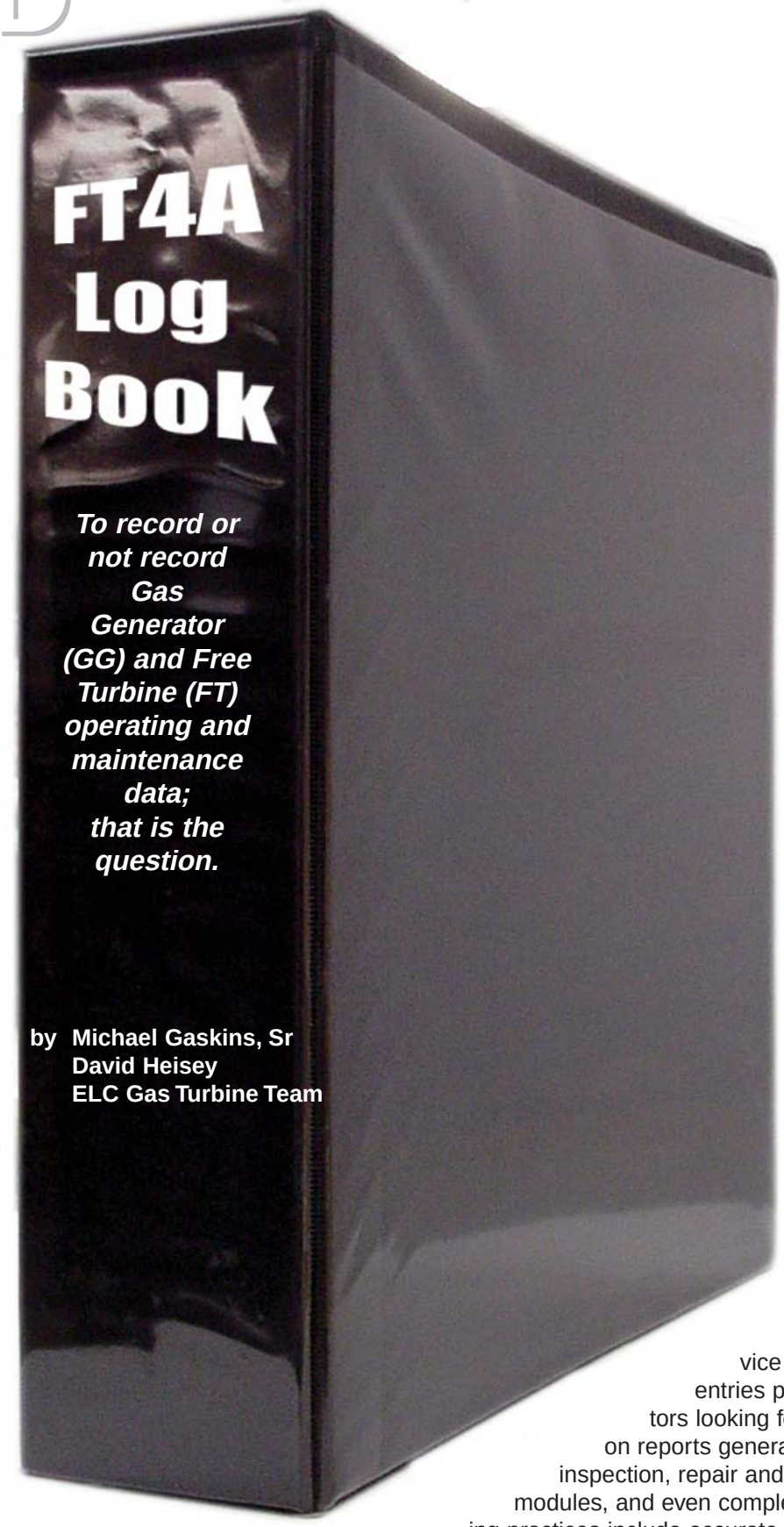
Including the United States, 19 nations attended the ST-SSD Working Group. One of the preliminary objectives of the project was to develop a common understanding between all ST-SSD participants on design guidance and standards for small ships. The team investigated many aspects of small ship and construction including:

- ❑ Mission Modularity
- ❑ Alternative and Advanced Hull Forms
- ❑ Power Systems and Propulsion Alternatives
- ❑ Standardized MEP and RAS Equipment
- ❑ Composite Materials
- ❑ Signature Management
- ❑ Ship Survivability
- ❑ Sea and Air Vehicle Launch and Recovery
- ❑ Manning / Human Factors / Automation / Maintenance Philosophy
- ❑ Life Cycle Cost

In addition, the Working Group developed a standardized template for small ship specifications. As part of this study, ELC-023 developed four ship designs and 20 trade-off studies to define a common understanding of the differences between SLC and OPV. Two illustrative examples of the work performed by ELC-023 include an assessment of how life cycle costs vary from OPV to SLC, and a technique for quickly assessing the impacts of added weight or volume on the total ship design. The figures below illustrate the cost that best defines the differences between small OPVs and SLCs. Combatants have a higher platform cost/ton, but as displacement increases cost/ton decreases for both vessels.







To record or not record Gas Generator (GG) and Free Turbine (FT) operating and maintenance data; that is the question.

by Michael Gaskins, Sr
David Heisey
ELC Gas Turbine Team

With the myriad of engineering documents and paperwork associated with daily cutter operations, why bother to fill in a log that probably won't be used or read by anyone. Besides, the Naval Engineering Manual (NEM) does not mandate using these logs, so why make more work for a routinely over tasked engineering department. On the surface these thoughts would appear to be valid. The ELC Gas Turbine Team (GTT) can certainly relate, having a combined 60 years of USCG naval engineering experience, which equates to a lot of paperwork. However, there are some inescapable truths in the gas turbine overhaul/repair support business that offer strong counter arguments on Gas Generator/Free Turbine (GG/FT) log keeping.

When a GG or FT is inducted for overhaul, one of the first documents reviewed is the operating log. Why?? This log, if properly maintained, provides critical information that helps establish a baseline for overhaul inspections and repair decisions. For instance, the recorded number of operating hours can be used to determine parts exposure to extreme variances in temperature/pressure as well as environmental elements, ultimately driving the extent of teardown/repair. Without this information, the contactor must perform the highest level of inspection, erring on the side of caution, dramatically impacting repair costs. In time, these repair costs are passed on to the requisitioner, with a current price tag of $850K for a GG and $204K for a FT. GG and FT logs also play an important role in failure analysis associated with catastrophic events. Data such as total operating hours, start/stops (cycles), service bulletins, maintenance patterns and other entries provide invaluable information to investigators looking for cause and effect answers. The follow-on reports generated from these investigations drive inspection, repair and replacement decisions for piece parts, modules, and even complete GG/FT power plants. Good engineering practices include accurate and timely machinery record keeping. The benefits from this effort cannot be overstated.

A few minutes to update your GG/FT logs on a regular basis will pay high dividends in long term technical/logistics support and help control escalating GG/FT overhaul costs.

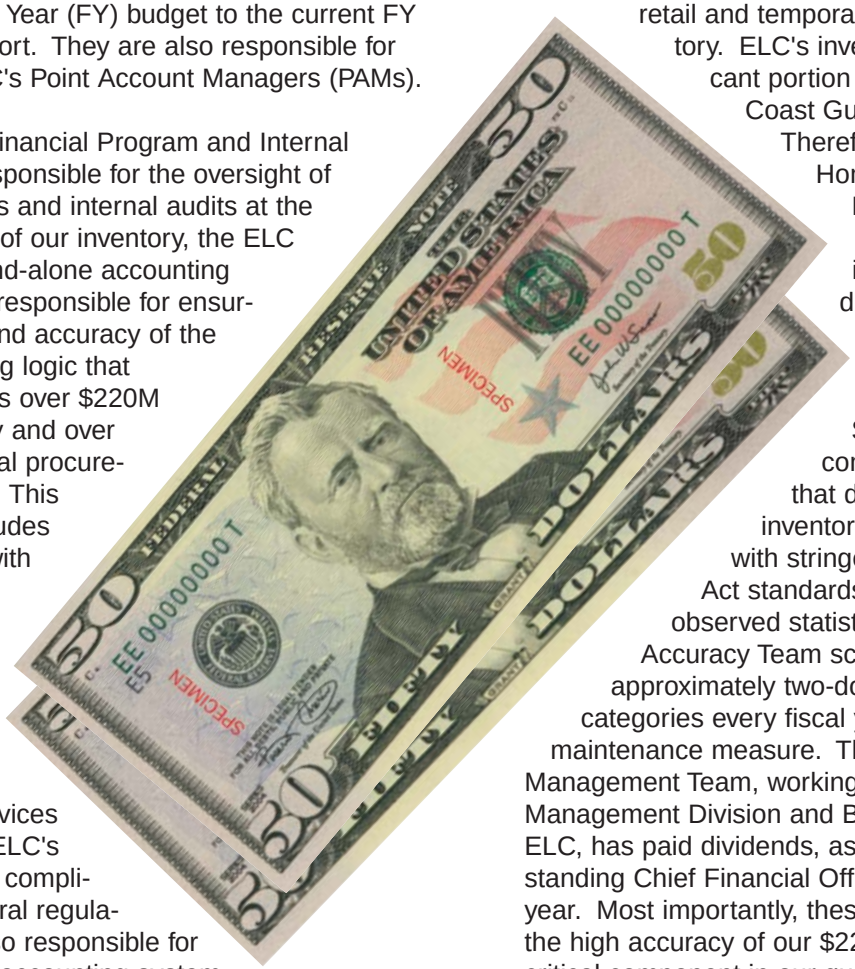
ELC-041, Financial Management Branch

by Ken Burgess

ELC's Financial Management Branch provides financial management and inventory accuracy support to facilitate ELC's core business of providing parts, service and technical support to the Coast Guard afloat community and ashore units. We also act as the ELC primary point of contact for all Chief Financial Officer Act requirements.

ELC-041A, Financial Operations and Execution Team, is responsible for all current year financial execution including AFC 30, 42, 43, 45 and 77, Acquisition, Construction & Improvement (AC&I), Engineering Change Request (ECR) and three Supply Fund (revolving fund) appropriations used to finance ELC's $220M inventory, general operations and fleet services. This team owns the financial execution process of approximately $150M in total annual funding from the development and preparation of the coming Fiscal Year (FY) budget to the current FY close out and report. They are also responsible for training all of ELC's Point Account Managers (PAMs).

ELC-041B, The Financial Program and Internal Audit Team, is responsible for the oversight of financial programs and internal audits at the ELC. As a result of our inventory, the ELC has a unique stand-alone accounting system. 041B is responsible for ensuring the integrity and accuracy of the accounting posting logic that records and tracks over $220M worth of inventory and over 16,000 commercial procurements each year. This body of work includes working directly with CG-8 (Planning, Resources & Procurement) and the Department of Treasury's Financial Management Services Office to ensure ELC's posting logic is in compliance with all federal regulations. 041B is also responsible for monitoring of the accounting system integrity through oversight of the internal control program. Under this program, ELC analysts conduct over 75 internal financial audits each fiscal year. These audits along with other processes result in the identification and correction of more then 1200 individual problem transactions valued at over $25M each year.



ELC-041C, The Inventory Accuracy Team, is the ELC auditor who evaluates and reports the physical inventory accuracy of ELC's $220M of wholesale, retail and temporary storage, spare part inventory. ELC's inventory accounts for a significant portion of the asset position on the Coast Guard's balance sheet. Therefore, Department of Homeland Security Office of the Inspector General (DHS-IG) closely scrutinizes ELC's inventory accuracy procedures and results at least one to two times per year by observing our quarterly statistical sample process. Statistical samples are very complex physical inventories that determine whether ELC's inventory accuracy is in compliance with stringent Chief Financial Officer Act standards. To prepare for the DHS-IG observed statistical samples, the Inventory Accuracy Team schedules and conducts approximately two-dozen inventories of varying categories every fiscal year, as a preventive and maintenance measure. The efforts of the Inventory Management Team, working closely with the Materials Management Division and Branches throughout the ELC, has paid dividends, as the ELC has received outstanding Chief Financial Officer Act results over the past year. Most importantly, these results are an indicator of the high accuracy of our $220M spare part inventory, a critical component in our quest to meet field unit operational needs.

ELC-042, Commercially Purchased Supplies -- Closing the Loop

by Jim McGuirk

Actual test setup of 6-place ATON Lampchanger.

When shopping for yourself and family, you may find yourself in a situation where the quality of service or item purchased leaves a lot to be desired. With your hard earned money on the line, it is a safe bet that you will do whatever it takes to get what you paid for and then think long and hard before buying from that supplier again. But what happens when the taxpayer is footing the bill?

ELC's Acquisition Branches take great pride in soliciting and contracting for products and services that you require to fulfill your mission. Through intensive market research, our technical staff, contract specialists and purchasing agents have identified vendors that can provide the products you need at a reasonable price and in a timely manner. But for most of the items we procure, we hear little feedback regarding the satisfaction of the end user. The old adage "no news is good news" does not always hold true. Too often, complaints are misdirected. In cases of free issue supplies, it is sometimes determined to be easier to just reorder.

Acquisition law provides us with a number of remedies when we receive non-conforming material. All such remedies start with the timely reporting of the discrepancy. ELC's Quality Deficiency Report (QDR) is an excellent tool for letting us know that the item you received does not fit the bill. It gets your immediate concern resolved by initiating action to replace the discrepant material. While your immediate concerns are being met, technical personnel examine all available stock in our warehouse to determine if the problem is an isolated incident or affects more of our pipeline. All non-conforming material is removed from stock and quarantined, protecting others from suffering your fate. Procurement personnel will contact the vendor and negotiate reimbursement or replacement of the incorrect material to replenish our warehouse and insure the taxpayers' rights are protected. QDRs received from the field can also result in changes to our specifications and statements of work, especially pertaining to Quality Assurance (QA) testing and inspection. In some cases, our inspectors will visit the contractor's facility and review their QA processes before the next procurement. They can also affect the outcome of future procurements. Depending on the number or severity of the discrepancies, such documentation can have a negative effect on the vendor's chance of winning future contracts with the ELC or warrant removal from a Blanket Purchase Agreement (BPA) or source list used in simplified acquisitions.

Acquisition Offices also receive feedback from Program Offices and Systems Management Engineering Facilities (SMEFs). This information often takes much longer to get to us, and is often too late to correct a discrepancy or be used to obtain corrective actions from a vendor. However, it is still valuable and can result in changes to specifications or statements of work for future procurements.

Positive comments regarding a product can enhance a vendor's chances of winning future contracts. We welcome this feedback as well. Please contact our Customer Service Branch and they will ensure your voice is heard. ST

Chief	Jim McGuirk	410-762-6486
Contract Specialist	Jo Ann DeBullet	762-6485
Contract Specialist	Florence Harwood	762-6455
Contract Specialist	Kathleen Harrigan	762-6481
Purchasing Agent	Brandie Dunnigan	762-6446
Purchasing Agent	Devora Ford	762-6507
Purchasing Agent	SK Ward Hill	762-6419
Procurement Technician	Cynthia King	762-6484
Technician	Laura Parry	762-6854

ELC-046, Blanket Purchase Agreements

by Robert Orofino

A Blanket Purchase Agreement (BPA) is a streamlined procurement method used in “Simplified Acquisitions” to purchase recurring goods and services. Basically the BPA acts as a "charge account" with specific vendors. All requirements of regulation (e.g., competition, dollar thresholds, synopsis requirements, etc.) are met in the parent document. This parent document has no funding associated with it. The actual purchase is made with a funded document called a BPA call. These calls are limited to specific personnel who have individual call limitations ranging from $2,500 to $100,000.00.

As an example, the Main Propulsion Acquisition Branch (ELC 046) currently has 25 BPAs established for many different types of commercial purchases. We have BPAs established ranging from Software purchases to the repair of a Fairbanks Morse pump. All these BPAs are to multiple companies and many are based on General Services Administration (GSA) Schedules, allowing the ELC to choose the company with the best qualifications and expertise while still meeting all Governmental requirements for Competition and Small Business Set Aside. Using these procurement vehicles facilitates the market research requirements and the creation of an independent Government estimate. We are able to quickly check and compare prices and labor rates for several companies. These companies have previously agreed to the labor rates or have given a firm fixed price to a specific task. In addition, all BPAs are established with pricing for a base year and up to four option years.

As an example: A requirement to review a Contract Data Requirements List (CDRL) for the GLIB (Great Lakes Icebreaker, MACKINAW) has come to the ELC from the shipbuilder. ELC's engineers will review the CDRL and also cut a purchase request to place a BPA call to the "subject expert" company. The company has previously priced out each CDRL for a base year and three option years. All that needs to be done is to create the Purchase Request (PR), select the CDRL number in the statement of work and forward the PR to procurement for ordering. When the contract specialist receives the PR, a telephone call is made to the company and the order is placed. All pricing, terms and conditions have been previously negotiated and agreed to. The system is so efficient that more time is consumed with entering the BPA call in our computer system than it takes to place the order.

In conclusion, use of BPAs as a procurement vehicle has enhanced our ability to better serve our customers. ST

CMplus 5.0 is Almost Here!

by LT Phillip Bruce, LT Rob Mitchell and LCDR Mitch Ekstrom

The long-awaited CMplus 5.0 is almost ready to be deployed, and may have already started by the time you read this article. After months of testing and de-bugging, the upgrade was sent to TISCOM [Telecommunication Information Systems Command] for certification, and they assure that the new or upgraded software interacts well with the standard Coast Guard image. However, TISCOM does not test the functionality of the software.

After the software is certified, it must be Beta tested in a "live" environment. This Beta test will take place within the Naval Engineering Support Unit/Electronic Systems Support Unit (NESU/ESU) Boston's Area of Responsibility (AOR) and will include a diverse set of test units. All functions will be tested, and any issues that arise will be addressed and corrected as rapidly as possible, in many cases on the spot. The CMplus deployment team (formerly Configuration Management Implementation Team (CMIT) under G-SLI (Office of Logistics Information), now Vessel Logistics System (VLS) Sustainment Branch under ELC) in conjunction with the Maintenance and Logistics Command (MLC) Centralized Supply Assist staffs will be on scene to coordinate and monitor the Beta test. Upon completion of the test, deployments will begin. It may take as long as two years to fully deploy CMplus 5.0 to the Coast Guard. The top priority units for deployments will be those designated by the Assistant Commandant for Planning, Resources & Procurement (CG-8) in order to best posture the service for future Chief Financial Officer (CFO) audits. As of this writing, that would include 378s, 270s, Air Stations, ESUs, ESDs (Electronic Systems Support Detachment) and all NESUs.

There have been many upgrades and enhancements to CMplus 5.0; the most obvious is the new Graphical User Interface (GUI). The old "green screen" look is gone; no more using the arrow keys to navigate through endless menus. Although it is still not a "true" windows program, the GUI provides the user with a much more familiar "point and click" environment. One drawback to the GUI is its inability to maximize, but the functional enhancements far outweigh this minor annoyance which will be addressed in future versions.

Many of the functional enhancements are products of user input from the field. CMplus 5.0 has the ability to attach any type of link (documents, digital pictures, hyperlinks) in many functional areas such as PMS, CMAs, CSMPs and SMPs. The maintenance scheduler has been redesigned and is now presented in list format in CMplus. For those of you that prefer your work schedule in calendar format, the schedule can be exported to Outlook, either in whole or in part. From Outlook, you will be able to synchronize your work schedule to your PDA. These are a couple of the major enhancements to CMplus 5.0, although there are many others, some more apparent than others.

All of the enhancements in CMplus 5.0 make it a more user friendly, more reliable, more useful logistics tool. The underlying purpose remains the same, but the only way to truly learn the application is to use it. If you are a competent user of CMplus 4.1, you will welcome CMplus 5.0. If you are a staunch critic of CMplus 4.1 then you will most likely feel the same way about CMplus 5.0. This is not the "cure all" that many have been waiting for, but it is a big step in the right direction. We welcome your constructive criticism. Together, we can make CMplus 5.0 and beyond an ever-better product. ST

CMplus Training

by Jim Lane

In a joint effort between the Office of Force Management (G-SRF) and the Office of Logistics Information (G-SLI), there are now two courses available for CMPlus users. There is the Centralized Supply course and the newly created CMPlus Maintenance course. Both of these courses are designed to give users a greater level of comfort when using the application. Use of the application is mandatory for units where the application is installed.

The **Configuration and Maintenance course** is designed for those individuals who are involved with the maintenance module of CMPlus. This course covers the following topics:

- Create, update, initialize local maintenance procedures.
- Input, update maintenance schedules, update maintenance tasks.
- Review, update, duplicate master tasks.
- Create, review, update corrective maintenance actions (CMA).
- Create, review, update, export current ships maintenance projects (CSMP).
- Create, transmit (CASREPs).
- Review, report maintenance history.
- Create, review, update, export Shore Maintenance Projects.
- Update configuration items, change cutter configuration.
- Create, review and update alteration items.

PREREQUISITES: E-5 OR ABOVE Machinery Technicians, Electricians Mates, Damage Controlman and Electronics Technicians assigned to and/or filling a billet afloat or ashore.

The **Centralized Supply course** is designed for those individuals who are involved with the management (orders, issues, stocking, receipts, inventory) of Operating Materials and Supplies (OM&S) and allowance items at Coast Guard units, regardless of rating. Topics covered include:

- MILSTRIP Codes.
- Physical Inventory.
- CMPlus Inventory Database Management, Issues and Receipts, Supply/Shipment Status.
- CASREPs.
- Material ID (FEDLOG).
- Orders (MILSTRIP and Commercial).
- Material Classification and Selected Item Management (SIM).
- CMPlus Basics (Sys Admin, Users, etc.).

PREREQUISITES: None

If you have the need to attend one or both of these courses, submit your short-term resident training request via the Training Quota Management Center. Both courses are five days in duration and held at TRACEN Yorktown, Virginia.

NESSS Up and Coming Changes

by Ruth Roskam

The ELC is continually looking at ways to improve the existing organizational software system so that it provides the most efficient processes for our users and customers. Some of the changes that will be made in the near future include the following:

Serial Control of Selected Inventory Assets - This system change will allow the ELC to track specific inventory assets by serial number, and will provide the ELC with more detailed monitoring of costs while enabling proactive cost management. Maintenance hours, parts, shipping and administrative costs will be able to be tied to an individual asset. A link will also be made to the Fleet Logistics System (FLS) database so that issue and receipt of serialized assets can be shared between the two systems. This will allow us to more efficiently track the asset life cycle history.

Web/Online Stock Availability Query and Requisition Status - These two features will provide a web portal into the ELC inventory so that customers can query parts availability and determine the status of their requisitions.

The stock availability query will allow our customers to query items managed by the ELC by National Stock Number (NSN) or cage and part number and find out the availability of these assets. The system will indicate if ready for issue assets are on hand and if not, when they are due in from the vendor.

The requisition status will allow our customers to input the document number of their requisition and determine if the asset has been issued, shipped or backordered. If the item is backordered the system will provide the customer with an estimated delivery date.

These two new functions will provide customers with immediate feedback on parts availability as well as the status of requisitions. This will provide a significant workload reduction for customer service representatives who field numerous calls daily regarding requisition status and stock availability.

Real-Time Wireless Warehouse - The existing Warehouse Management System is equipped with a 900Mhz Intermec handheld barcode scanners and an RF network controller that sends all warehouse transaction data (e.g., pick, pack, ship, stow, location changes, etc.) to a text file. The transactions remain in a text file until a warehouse employee runs the batch transaction file to upload the data into the production system. The ELC has found this process to be inefficient because the data being scanned is not real-time nor is the end user given any sort of indication that the transaction was successfully scanned. This causes mistakes with incorrect items, locations and quantities being scanned. These errors may not be discovered until after the product is shipped to our customers. This scenario is unacceptable.

The ELC is upgrading its barcode equipment and existing software to take advantage of better communications capabilities with a new WMC III device and network. The upgraded software will allow a real time access solution to the production environment. When the user scans the transaction, the information will be uploaded instantly to the production database. This will reduce the number of errors needing researched and resolved. The warehouse can correct the transaction prior to the data being written to the production system, eliminate the need for human intervention to transmit data and facilitate the timely notification of errors.

The move to a wireless warehouse will increase item management efficiency and effectiveness for filling requisitions for our customers. Time spent previously researching errors will be better utilized within warehouse efficiencies.

FedEx Integration - This new function automatically provides a link between FedEx and the ELC's organizational system. When an asset is shipped via FedEx, the information is downloaded into the organizational system. This provides more timely update of shipping information because the user is not required to scan the information into the system, and the ELC can provide its customers with timely shipping information.

Barcode Receiving Functions - As soon as material is delivered to the ELC, specific information is placed in a receiving database, i.e., door date, document number, quantity, etc. Manual data entry has caused delay in the delivery of material to customers or stowage locations. This function will allow the warehouse to scan information from the delivery report received from the vendor.

This process will further expedite delivery to the customer and result in a more efficient and effective receiving process.

COSAL/SCLIS Weapon System Files (WSF) - Navy-Type, Navy-Owned (NTNO) electronics and ordnance logistic support information is currently being managed through the Navy's COSAL/SCLSIS system. A conversion application "bridge" to transfer the data from the Navy's System File to the ELC provisioning module is required. This will allow the migration of all applicable Allowance Parts List (APL) data for over 3000 NTNO APLs. This data will be provided to the unit via CMPlus. Automatic refresh capabilities will ensure updates are received from the WSF and processed in a timely manner.

Automatic Issues to Disposal on a Quarterly Basis - This function will automatically issue non-supply fund inventory that has been coded as excess to the Defense Reutilization and Marketing Office (DRMO) at the end of the quarter. This process will improve the effectiveness and productivity of item management by automatically creating the issue to disposal, thus reducing excess and obsolete inventory in a timely manner.

FT4A Gas Generator and Free Turbine Overhauls

by Michael Gaskins, Sr. and David Heisey

As one of ELC's many logistics support managers, the Gas Turbine Team (GTT) is responsible for ensuring there are always "A" condition Gas Generators (GGs) and Free Turbines (FTs) on the shelf to meet WAGB/WHEC fleet needs. Many of our customers may have different perceptions regarding the definition of "A" condition asset, and this article attempts to clarify those perceptions. First, in the GG/FT repairables arena, "A" condition does not mean "new," since the last units to roll off the assembly line occurred in the late 1970s. Accordingly, what a requisitioning unit can expect to receive is an overhauled GG or FT that is essentially "zero" hour. That means it has gone through an extensive overhaul process that includes tear down to component level, inspection, repair as necessary, service bulletin upgrades, reassembly, testing and preservation/packaging. This overhaul generally averages three to five months to complete, and is driven by the extent of component repair, parts availability, scheduling with other shop work, availability of test cell and of lesser extent to the government's own procurement system. In accordance with contract requirements, the contractor must generate numerous reports at critical stages in the overhaul process that must be reviewed, corrected, resubmitted and finally approved before work can proceed, adding significantly to the overhaul timeline. Nevertheless, in the end, the procuring activity and ultimately the end user gets a quality product that should be as close to "new" as possible. Although the spare "A" condition GGs and FTs in ELC 's inventory exceed 30 years in age, each has been overhauled and tested to new Original Equipment Manufacturer (OEM) standards, assuring that design operation and performance parameters will always be met or exceeded after installation.

NE-TIMS -- It's Not What It Used to Be

by Ronald Messerschmidt

The Naval Engineering Technical Information Management System (NE-TIMS) is going through a major upgrade. A comparison of the two systems follows.

The current system consists of a client-server configuration, using Sun E450 Microsystems with internal software RAID management. It is composed of two single 250 MHz UltraSparcII processors with 256 MB of physical memory per server. The system utilizes two 4.2 GB 7200 RPM non-mirrored disks for the Operating System Disc Hard Drive Space. Its Storage Disk Array Characteristics consists of twelve 9.1 GB on board drives (plus one hot spare) using software RAID5 management. Although the servers are separate, a cluster management file system was set up in a file-sharing environment so that they appeared to be one system to both customers and to us, the data managers. However, as a result of file space considerations, the failover server was opened to allow for additional requirements. Consequently, there is currently no disk redundancy. As a failsafe, and in order to ensure system integrity, tape backups are performed nightly. To date, the total available file storage is 198 GB. The Operating System (OS) is Solaris 8 (Sun's version of Unix) and the database was built using the Oracle 8i software program. Customers access the NE-TIMS system via the Coast Guard Data Network + (CGDN+) (Intranet only) using a default "guest" sign-on and password. Customers approved for higher access levels have been assigned passwords. The database was built using Apple Web Objects (a code-free generation program). Although state of the art in 1999, the servers have quickly become outdated and overwhelmed by the sheer number of Coast Guard drawings and technical publications.

In January 2004, the Office of Logistics Information (G-SLI) approved and procured the "new" NE-TIMS servers. The new system also consists of a client-server configuration. It utilizes twin Sun Microsystems Sunfire 280R and two 3310 Hardware Array Managers using Sun Cluster High Availability (HA) platforms. A Sun 150 workstation serves as its cluster management server. It has dual 1.2 GHz UltraSparcIII processors that operate 480% faster than the previous servers. Additionally, it has 8 GB Physical Memory per server that processes information 32 times faster. The Operating System Disc Hard Drive space has a 73 GB 10,000 RPM FCAL, mirrored to a second identical disk on each server. Sun Cluster technology ensures host fail over. The Storage Disk Array Characteristics consists of nine 73 GB (plus a hot spare) under hardware RAID management, in addition to 73 GB disks for HA applications. RAID and other disks are each mirrored to a second hardware manager for complete redundancy. Most importantly, the total file storage for the new system has been increased to 544 GB. The servers will be set up and controlled by a management server and both servers and RAIDs will be completely redundant -- so that a system failure is theoretically impossible and invisible to our customers (barring an extended power failure). The new servers went on-line during August 2004.

The following software agents are employed to carry out our daily processes:

Scandex	Used for scanning large formatted drawings.
Assent Batch	Used for scanning volumes of small formatted pages.
Adobe Acrobat	Used for scanning technical publications.
AutoCad	Used to manage .dwg and .dwf formatted Naval Engineering Drawings.
Volo View Express	Used for converting AutoCad drawings into .pdf files.
Paperport	Used for small scanning jobs into an array of forms.
Trix	Used for converting .cal files.
SQL Pus	Used for managing and querying our Oracle file system.
Samba	System that converts database files into a windows-type file system.
Putty	A server file management system (similar to Telnet).
FTP (File Transfer Protocol)	Used for moving data in and out of the repository.
Microsoft Office	Used for creating and tracking various small databases.

Anti-Icing

by Michael Gaskins, Sr. and
David Heisey

The purpose of anti-icing on a gas generator is to prevent ice build-up on the Inlet Guide Vanes (IGV) and shroud which unchecked could seriously damage internal rotating parts or cause flameout if ingested. On an FT4A, hot, high-pressure air is tapped off the 15th stage high compressor and piped to the inlet guide vane housing through an electrically operated solenoid valve. When the operator energizes the valve, this air is distributed through the hollow vanes and shroud, preventing ice formation on these surfaces. This system works extremely well on aircraft engines operating at various altitudes/conditions and remains critical to flight safety, but its validity for marine applications at sea level has become controversial.

Pratt & Whitney, the Original Equipment Manufacturer (OEM), has determined that precipitate icing, even with perfect conditions, does not always occur. Further, precipitation is largely dependent on surface condition, and the smooth rounded surfaces of the FT8/FT4 inlet bell mouth, as well as the faired vanes within the inlet shroud, impede this action. These conclusions seem to be supported by commercial operators who use gas generators for marine propulsion without anti-ice capabilities without adverse effects -- Finjet, who routinely operates a fleet of Gas Generator (GG) powered fast ferries in frigid climates, as well as the Canadian Navy, are a few examples. Additionally, the use of anti-icing does come at a cost, robbing the engine of approximately 3% power and 2% increased fuel consumption. Interestingly, cracking of IGV cases at the anti-ice inlet boss are becoming more predominant as these engines age, prompting costly repairs and modifications. Whether this is due specifically to age, cyclic thermal stress or a combination of the two has not been determined, but many engineers believe this problem could be alleviated by removal of all anti-icing hardware.

Of course, when the FT4A was originally installed on the WHECs (High Endurance Cutters) (1960s) and the WAGBs (Polar Icebreakers) (1970s), the use of anti-icing was stressed by the OEM, evidenced by incorporation in the FT4A Main Gas Turbine Shipboard Maintenance Manual, a proprietary technical publication of Pratt & Whitney. Since the FT4A is a flight derivative of the J75 gas turbine, it's easy to see how that requirement originated and eventually found it's way to the marine application.

During the past two Deep Freeze operations (2003 and 2004), the POLAR SEA and POLAR STAR experienced IGV cracking early in their deployment, in the vicinity of the anti-icing inlet port. In each case, anti-icing on the affected GG was not operated for remaining operations and ice build up did not occur. This would seem to offer more justification for removing anti-icing equipment from all WAGB and WHEC platforms, but the "nice to have just in case" mentality remains difficult to overcome. Also, there are questions of cost and value added, especially given the remaining life of the WHECs and possible propulsion plant changes on the WAGBs. Obviously, there are more questions than answers at this point.

In summary, the purpose of this article is to provide the latest information on anti-icing and the controversies surrounding its use and future support in the marine environment. It is not intended to change or supercede current shipboard operating policies/procedures, rather to educate operators and supervisors regarding anti-icing use and promote dialog between the ELC and the fleet on this issue. ST

Mobile Coast Guard Aviation

Training Center Strives for Environmental Excellence

by **Julie A. Best**
Public Affairs Specialist
USDA-Natural Resources Conservation Service

The Coast Guard Aviation Training Center (ATC) is a 221-acre facility, formerly used by the Air Force Reserve, located 12 miles west of Mobile, Alabama on the north side of the regional airport. The primary mission of the ATC is transition training of Coast Guard aviators. Other missions include search and rescue, law enforcement, maritime pollution prevention and polar operations.

In 1999, the ATC implemented beneficial landscaping to enhance the base environment. Beneficial landscaping is the term commonly used to describe an approach to landscaping which uses native plants and selected mowing to achieve the goals of reducing maintenance cost, managing harmful runoff and increasing wildlife habitat. According to ATC's former Executive Officer, CDR Paul Francis, "We want to be sure that the activities of the base are good, not only for Alabama, but also for all our Coast Guard customers. Most Coast Guard aviators begin their careers here, and all Coast Guard aviators come back here at least once a year. We want those experiences to be good ones."

To develop the environmental plan, the unit called a meeting of various environmental experts to help flesh out the options. These experts included unit and headquarters' environmental personnel, the local Alabama Cooperative Extension System agent, master gardeners, and a representative from the local U.S. Fish and Wildlife Service and USDA-Natural Resources Conservation Service. The group established goals for the unit including: reduced grounds maintenance costs by 25 percent in the next three years; improved landscaping appearance around the facility; efficient use of water; and reduced erosion and surface runoff.

Grading begins for the constructed wetland.

With an annual average rainfall of about 64 inches, erosion can be a significant factor in Mobile. Reducing sedimentation of local water bodies including streams, estuaries, and ultimately, the Mobile Bay is an identified objective of the Mobile Bay National Estuary Program. ATC Mobile is in the forefront of this initiative. In addition, pollution prevention in Mobile Bay has a direct impact on the Coast Guard mission. Mobile Bay is the training site for rescue swimmers and training can only be conducted when water quality is at a safe level for humans.

To improve the quality of storm water runoff through the Center, a constructed wetland was a part of the beneficial landscape plan. Wetlands are important for many reasons. They prevent flooding by holding water much like a sponge. Wetlands help keep river levels normal. Wetlands accept water during storms and whenever water levels are high. And, when water levels are low, wetlands slowly release the water. Wetlands directly improve other ecosystems by serving as a filter to cleanse the water by trapping sediment, nutrients and other water-born pollutants.

The drainage area for ATC is 460 acres. Because of the lay of the land, much of the water from surrounding properties, the runoff from roads, nearby commercial activities and adjacent airport property transits the Center's runoff system. The drainage route for the Center's storm water starts with Pierce Creek, to Big Creek, to Escatawpa River, to the Pascagoula River and eventually to the Mississippi Sound.

The Center knew what they needed in a wetland, but how could they meet this goal within the budgeted amount? They sought the assistance of the USDA-Natural Resources Conservation Service (NRCS). For approximately 80 years, NRCS has been helping private landowners control erosion while conserving and improving all natural resources. As a cooperating federal agency, NRCS engineers had the expertise to provide guidance for the constructed wetland. The Center had the capability to take those guidelines and complete the project. "Our facilities engineers do a great job. They have taken the engineering program at the Center to the next level -- they go beyond the normal," says LT Andrew Wright, Assistant Chief for Facilities Engineering Division.

The Coast Guard provided a very detailed topographic map of the site for use in sizing the wetland pond. NRCS surveyed cross sections at the water control structure site for use in setting the exact elevations for the structure. After reviewing the site data, NRCS provided options for constructing the wetland and water-control structure. The Coast Guard selected the option that met their objectives and best fit their budget, aesthetic requirements and maintenance operations program.

Due to the large drainage area, it was impractical to construct a water control structure large enough to convey the total runoff from large storms. A shallow weir structure was selected to control the water level at the desired elevation. This structure, and the associated low, vegetated dike, would withstand overtopping

The site is prepared for construction of the articulated block weir.

The wetland at full pool. The wetland is good for the environment as well as being aesthetically pleasing.

Installation of articulated concrete 6-inch blocks is preferred over solid concrete. Cracks between the blocks will be filled in with soil to promote vegetative growth and make the area appear more natural over time. The majority of the work was done in-house.

David Britain, Environmental Protection Specialist, Coast Guard; and Mac Nelson, Design Engineer, USDA-Natural Resources Conservation Service, inspect the flashboard inlet structure.

16,000 trees were planted on the base as a part of the beneficial landscaping plan.

flows of larger storms. Six-inch articulated concrete blocks were used in the construction. This material fits together like a jigsaw puzzle and holds soil between the blocks. Over time, vegetation will grow between the blocks giving the area a more natural appearance. Downstream from the weir, the structure was sloped and covered with riprap. A synthetic material known as geotextile was placed between the soil and the blocks and riprap to enhance water movement and to prevent soil erosion from underneath the structure. A small pipe with a flashboard inlet was installed to enable fluctuation of the water level in the pond, which would help with establishing and maintaining wetland plants. The bottom of the pond was contoured to have varying depths suitable to a variety of plants. The USDA-NRCS Plant Materials Center at Americus, Georgia, provided a planting plan.

Construction of the wetland took approximately six weeks. The majority of the work was done in-house with the contractor on base and sub-contractors. "Don't underestimate the groundwork that NRCS did. They provided the guidelines and we implemented the plan," said Evon Housen, Base Civil Engineer. Heavy winter rains have tested the structure. The structure has worked as planned.

"One of the keys to the success of ATC Mobile's beneficial landscaping project is the use of local expertise. By partnering with local, state and federal agency personnel, the unit benefits from reduced costs. In addition, we're working with personnel who understand the local ecosystem," says David Britain, the Environmental Protection Specialist at the ATC.

Since implementing the beneficial landscaping approach in 1999, ATC Mobile has implemented a number of environmental projects. The Center reduced high maintenance areas, which required weekly mowing, as well as irrigation, fertilizing and pesticides application, by designating over 50 acres of no-mow zones. To augment the no-mow zones, the Center has planted 16,000 native trees. Implementation of the natural areas has reduced ground maintenance costs by 30 percent.

The Coast Guard Aviation Training Center is well on the way to achieving their goals in beneficial landscaping. According to former Executive Officer CDR Francis, "This is the first station that I have been in that is so environmentally aggressive. The only word to describe this base is state-of-the-art."

In recognition of the environmental improvements, the Mobile ATC has won two awards: Coast Guard Environmental Award for Overall Environmental Excellence and the Department of Transportation Environmental Achievement Award for Model Facility Demonstration.

NRCS applauds the work of the Mobile Coast Guard unit. Conserving and improving our natural resources is our mission. We are grateful for the opportunity to have a small part in helping the Coast Guard Base achieve their environmental objectives.

BOAT TRAILER BRAKES

Something to make you STOP and think!

by CWO A. Murray
NESU Portsmouth

While traveling down today's highways towing a boat and trailer, the last thing you want to worry about is stopping or having your trailer come loose from your tow vehicle. Trailer towing safety is very important.

Let's talk first about the Safety chains. Secure the safety chains to a solid bumper brace or through the holes normally provided in your tow vehicle hitch. Leave enough slack so that the trailer and the tow vehicle may turn without putting tension on the chains. Remember, this must make a solid connection.

HYDRAULIC (SURGE) BRAKES

If your trailer is equipped with Hydraulic (Surge) brakes, read the following to make sure you understand their operation.

When you apply your tow vehicle brakes, the trailer will try to push forward against the car. This push compresses the actuator mounted as part of the hitch, which applies force to the master cylinder, which creates hydraulic pressure to operate the trailer brakes.

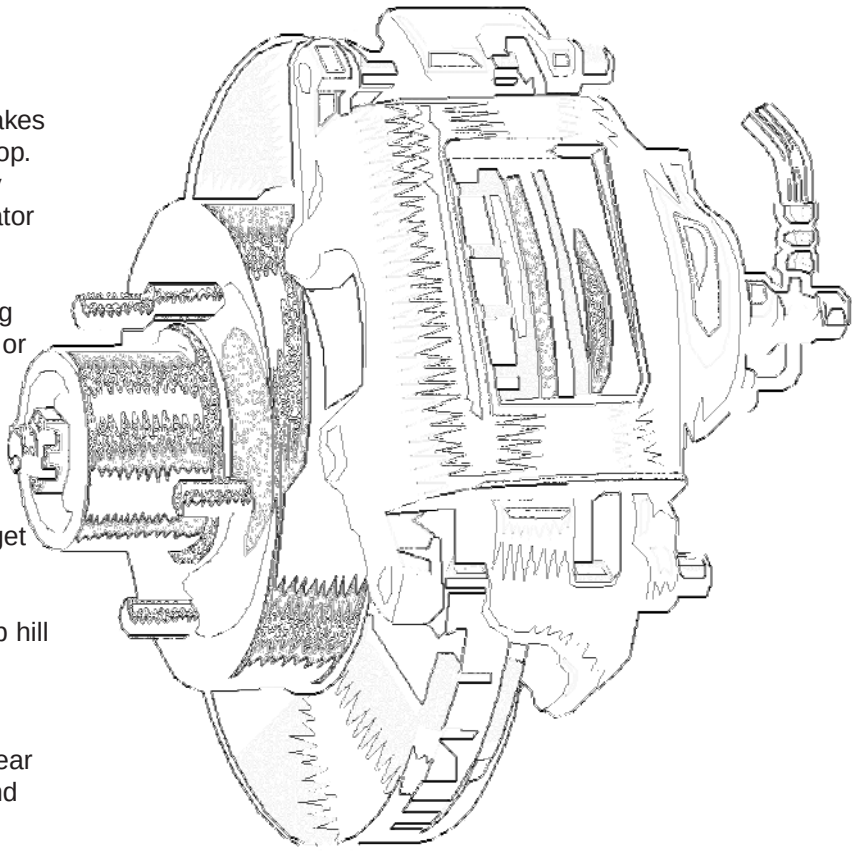
The harder you stop, the more hydraulic pressure you generate, and the more forcefully the brakes will be applied. The safety chain must be loose enough to permit free motion of the actuator assembly. And remember, brakes work poorly when they get wet.

The surge brake system is equipped with a breakaway cable or chain that connects directly to the tow vehicle, not to the SAFETY CHAIN mentioned above. If the trailer gets loose from the tow vehicle, the breakaway cable or chain will cause the brakes to engage and try to stop the trailer. Make sure that this chain is fastened securely to the tow vehicle. It should have some slack so that it will not engage the brakes while the trailer is still connected to the tow vehicle. The chain should be loose enough, even during turns, so that the breakaway lever is released (pointing all the way to the rear of the trailer) while the tow vehicle and trailer are engaged. Check this each time before you use the trailer. Accidental application of the lever will cause the trailer brakes to engage, drag, heat up and perhaps burn out. Do not use the emergency breakaway system as a parking brake.

The surge brake actuator linkage and the sliding mechanisms should work freely through the full range of travel. Do not mistake shock absorber resistance in the system for binding. If you encounter erratic or unusual braking performance, investigate the cause immediately. The trailer should not push

the tow vehicle, or try to jackknife during stops. The brakes should release when the trailer is pulled from a dead stop. To be sure the brakes are releasing properly, pull gently from a dead stop and then slowly stop so that the actuator ends up in a fully extended position.

Don't make really tight turns. Extreme turns, while going forward or backwards, may cause damage the actuator or other associated parts of the tow vehicle or trailer.

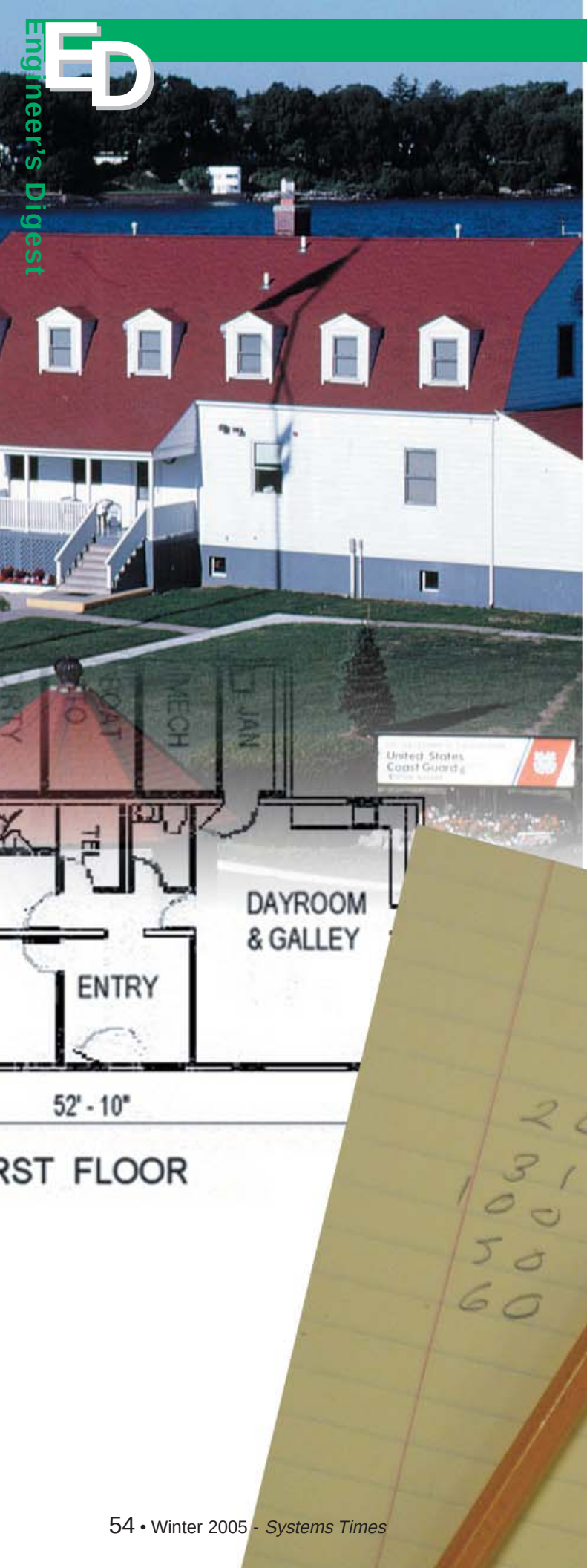


TOWING WITH THE HYDRAULIC (SURGE) BRAKES:

When you back up, the brakes may apply and you will get some brake pressure. Damp brakes may tend to seize when backing. Back slowly and steadily. You may have trouble with brake actuation if you try to back up a steep hill or driveway.

Make sure that the trailer is towed in a level position. It should never be towed with the tongue lower than the rear of the frame, as this will cause the brakes to activate and stay on during normal towing.

Make sure your tow vehicle brakes stay dry. They work poorly when wet. Be extra careful just after ramp launching or recovery. ST



Pre-Project Planning -

Applying the Project Definition Rating Index to Coast Guard Capital Projects

by **LCDR Jeff Brockus, PE**
Facilities Design and Construction Center Pacific

A typical project life cycle is comprised of four phases, the initial business planning, pre-project planning, project execution and facility operation. During the initial planning phases, a small expenditure of effort can greatly influence the overall definition of the project. And on the other hand, when the facility is complete, a large expenditure of effort (time and money) is needed to change the form or function of a facility. Placing the effort early during pre-project planning improves project performance in areas of both cost and schedule.

Although the Coast Guard's shore facilities capital asset management and planning process is highly successful for funding and comprehensive in major planning efforts, it can lose some of its clarity in the details specific to project scope definition development. A recent study showed

scope deficiencies can and do exist within projects that undergo the thorough preplanning practice. One account for this anomaly is that the military nature of the Coast Guard results in multiple personnel changes within the project team and end-users over the project life cycle resulting in a loss of planning continuity.

The Project Definition Rating Index

In 1998, the Construction Industry Institute (CII) developed the Project Definition Rating Index (PDRI) for Building Projects as a "best practice" tool applicable to multi-story or single-story commercial, institutional or light industrial facilities. The PDRI is a checklist that scores each project's level of scope definition on a 1,000-point scale where the lower the score, the more the scope is defined. Results of a comparison of industrial projects showed that those projects, which scored below 200 on the PDRI, had higher cost savings, nearly 20%, significant schedule reduction, about 13%, and fewer change orders.

The PDRI offers many benefits including:

- standardize scope definition terminology,
- facilitate risk assessment,
- monitor progress during the pre-planning stage,
- enhance communication, and
- promote alignment while reconciling differences within the project team.

The PDRI also acts as a benchmarking tool to quantify scope definition performance against an industry standard or within an organization.

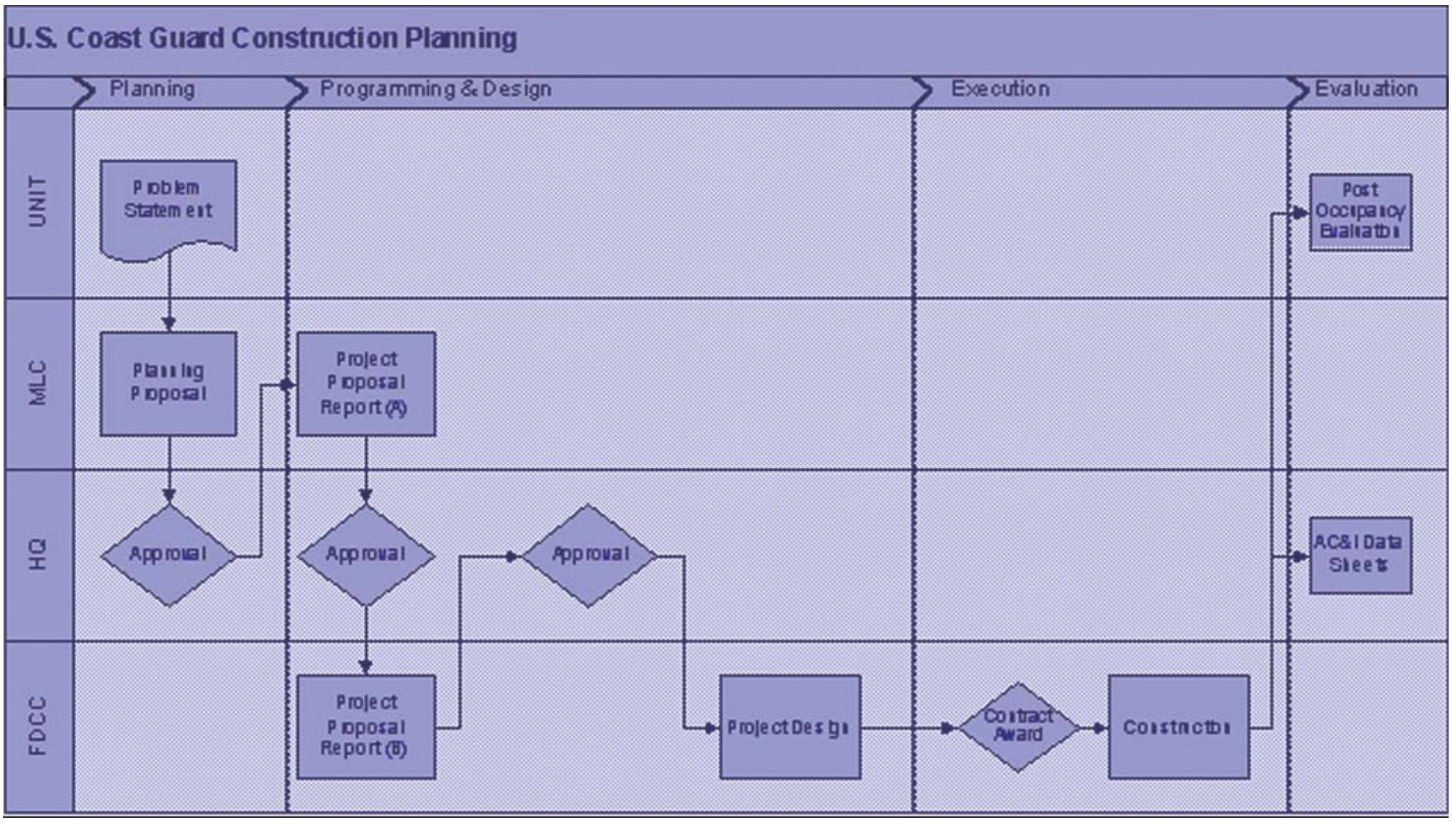
Several agencies of the federal government have adapted the PDRI as a preplanning tool for capital projects. The National Aeronautics and Space Administration and the Department of Energy's Office of Environmental Management have developed an agency-specific PDRI to better define the scope of their capital projects.

U.S. Coast Guard Capital Asset Planning

In order to remain Semper Paratus as the nation's premier maritime service, the Coast Guard relies on a fully functioning and modern shore facility infrastructure to support our diverse missions. To meet this desired state and to ensure consistency in its planning effort, the Coast Guard created the Shore Facilities Project Development Manual, COMDTINST M11010.14. The manual includes planning guidance for shore facility Acquisition, Construction and Improvement (AC&I) funded projects. The process is divided into four phases: planning, programming and design, execution and evaluation.

The planning process, as illustrated in Figure 1, involves several steps: identifying present and future missions in order to analyze the required facilities to carry out these missions; assess the existing shore plant's ability to sup-

Figure 1. Current Coast Guard Planning Process.



port these missions; develop a plan to correct resulting deficiencies and determine the most efficient use of existing assets. The first step is for the submission of a Problem Statement (PS) to identify a potential deficiency in shore facilities requirements. Approval of the PS constitutes validation that the problem is worthy of further study and it is placed on the Shore Facilities Requirements List (SFRL). The SFRL is a backlog of approved Problem Statements. Prioritized Problem Statements from the SFRL backlog are developed into a Planning Proposal (PP), which provides significant detail of an existing problem, desired state, alternatives and offers a recommended solution.

Programming and Design further develops solutions for approved Planning Proposals. This process is documented by the Project Proposal Report (PPR) Parts A and B. The PPR(A) establishes the conceptual design and delineates the project scope based on the PP's approved alternative and planning factors. This document also establishes the scope of work under which a designer will further develop the design. The PPR(B) is a project schematic design based on the PPR(A) and completed to the design development (i.e., 35%) stage. This document finalizes the scope and budget and is the basis for obtaining funds from Congress to complete the project.

Once funds are obtained, the design can begin in earnest. Once the design is completed, construction documents are readied for execution. Execution includes solicitation, contract award, construction monitoring and evaluation. Post Occupancy Evaluation (POE) is the process of monitoring a project after it's complete, to determine the effectiveness of the shore construction program and examine the warranty period performance and often completed by the benefiting unit.

The Shore Facilities Project Development Process described above typically requires a minimum of five years from initiation of a PP to construction contract award. While smaller AC&I projects may require a shorter cycle, some more complex AC&I projects may require lengthy planning that could extend the cycle beyond five years. Realistically, the development of project documentation is the limiting factor for the planning cycle and must be accomplished with diligence in a timely manner.

Scope Definition Evaluation

A recent study to determine if the PDRI could be a useful tool in Coast Guard capital asset management was conducted by evaluating a project's initial scope definition immediately after project completion. To complete the evaluation, a detailed survey was conducted of several recent projects to measure the desired outcome with the actual outcome by comparing original budget with actual construction costs, contract schedule delays and change order requests. Since the questionnaires were answered after construction, the data can be considered subjective in nature, but provides some initial validation warranting future study.

Six of the seven projects reviewed scored above 200 on the PDRI-CG. When compared with the original PDRI validation study, costs and change orders affected the Coast Guard projects to a lesser degree. But breakdown during pre-project planning did affect the schedule substantially with an addition of time to the project schedule. Table 1 considers those Coast Guard projects that scored over 200 and compares them with the original validation study.

The five highest scored scope definition elements are listed in Table 2. Three of the five are from Category C - Project Requirements; indicating a lack of thoroughness in establishing the initial design project needs. The remaining elements also point to an insufficiency in early design development.

Performance	PDRI <200	PDRI >200	PDRI-CG >200
Cost	1% below budget	6% above budget	4% above budget
Schedule	1% behind schedule	11% behind schedule	21% behind schedule
Change Orders	6% of budget	10% of budget	4% of budget
	(N=14)	(N=16)	(N=6)

Table 1. Summary Comparison of PDRI and PDRI-CG Scores.

Element	Description	Median Score
C3	Evaluation of Existing Facilities	3
C6	Project Cost Estimate	3
D6	Utility Sources with Supply Conditions	3
A5	Facility Requirements	3
C4	Scope of Work Overview	2

Table 2. Five Highest Scored PDRI-CG Elements.

U.S. Coast Guard Implementation Plan

Using the PDRI-CG as a pre-project planning tool can be accomplished at least three times in the Coast Guard Construction Planning schedule. All of the project's end users or customers should be represented during the scoring process, along with the design, construction and procurement teams. An important lesson from the NASA PDRI implementation calls for the inclusion of a trained, non-biased facilitator to moderate the meeting and scoring process.

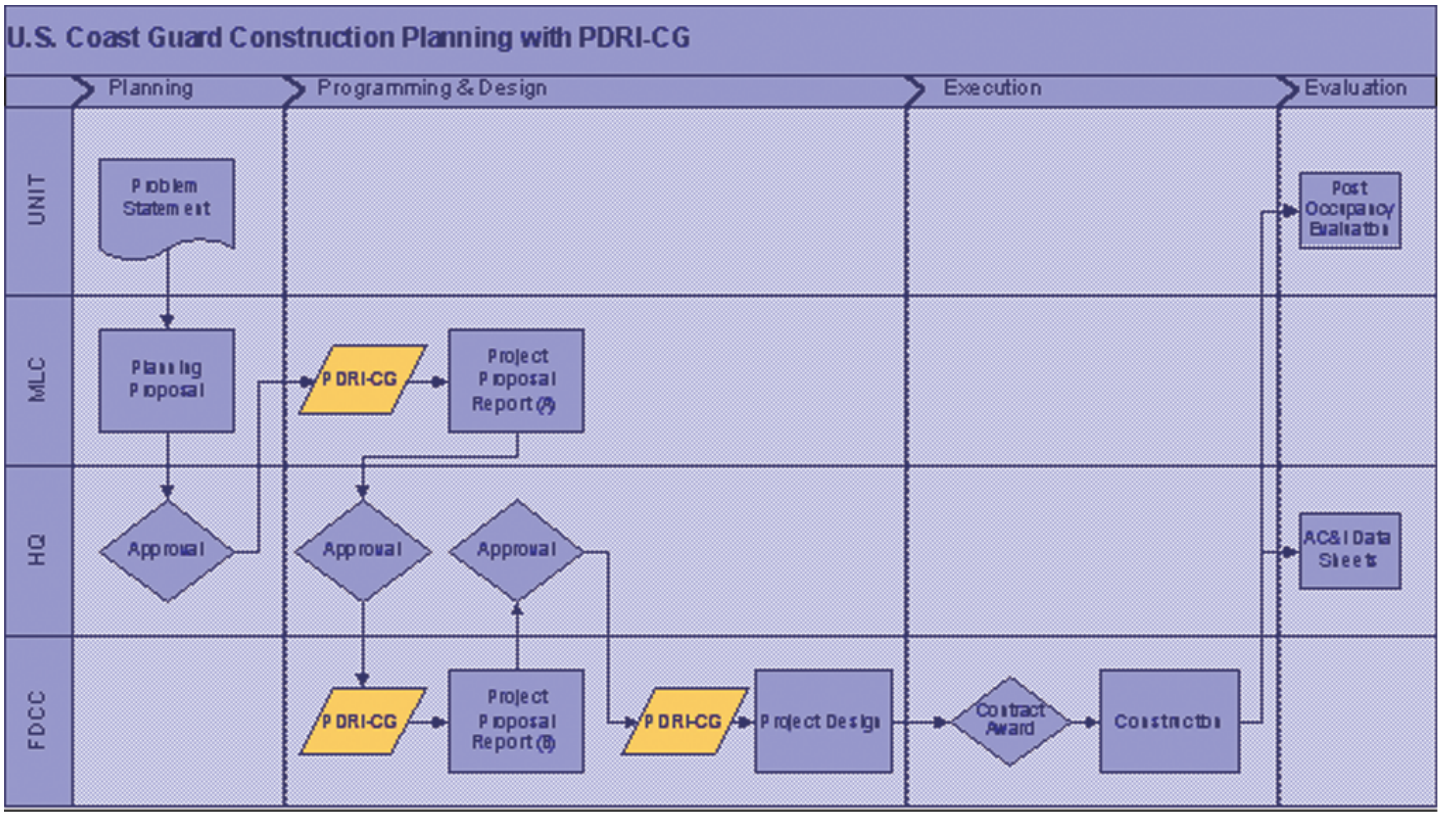
The first evaluation point would be the first step in the preparation of the PPR(A). The responsible Maintenance and Logistics Command (MLC) planning staff carries out the development of the PPR(A). Here is the best opportunity to involve the customer(s) and the long-range asset planning teams.

The next evaluation point would be as part of the preparation of the schematic design or PPR(B). Since the PPR(B) is the critical phase where expectations are set, the PDRI-CG would best assist in the determination of the general scope, preliminary design, component relationships and scale of the project. A clearly defined scope at this point greatly reduces, or at least a better understanding of the risk to the budget and to the schedule.

The last recommended evaluation point would occur prior to the development of the project design. Since at this point the PPR(B) is approved, the designer can develop the necessary level of detail to work out a clear description of all characteristics of the project. This phase is the last chance for significant design input since any scope or programming change after this point would most likely incur budget and schedule impacts. Figure 2 shows the Coast Guard Capital Planning process with the PDRI-CG evaluation points.

Of course, the PDRI-CG is a best practices management tool and can be administered at any point in the planning and construction process. It can also be used on specific categories to assess the completeness of various design elements or features. Even using the PDRI-CG from an individual standpoint as a checklist provides a beneficial method for project evaluation.

Figure 2. U.S. Coast Guard Planning Process modified with PDRI-CG.



Conclusion

When used as an assessment tool, the PDRI quantifies the level of pre-project planning at any point in the process and allows project managers, designers and owners to ascertain a level of comfort with the course of the project. The PDRI is flexible in form and can be customized to suit various project types. Adding the PDRI to the Coast Guard Planning Program can be accomplished readily with verifiable results obtained with relative ease.

The PDRI-CG can be used to sharpen the project scope, to reap the benefit of fewer changes, improved cost estimates and less schedule delays with a reduction of 5% in design and construction costs producing annual savings in excess of $3.0M. Besides cost savings, long-term use of the PDRI-CG on capital asset projects will benefit the Coast Guard by providing superior facilities to further support and enhance our diverse missions.

Please indicate your best answer.

Definition Levels:

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

USCG Project Definition Rating Index
Conventional Projects - Pre-Conceptual Design Phase
SECTION I - Basis of Project Decision

CATEGORY / Element		Definition Level 0	1	2	3	4	5	Score
A. BUSINESS STRATEGY								
A1	Building Use	0	1	12	23	33	44	12
A2	Business Justification	0	1	8	14	21	27	1
A3	Business Plan	0	1	8	14	20	26	2
A4	Economic Analysis	0	1	6	11	16	21	2
A5	Facility Requirements	0	2	9	16	23	31	9
A6	Future Expansion/Alteration Considerations	0	1	7	12	17	22	7
A7	Site Selection Considerations	0	1	8	15	21	28	1
A8	Project Objectives Statement	0	1	4	8	11	15	4
	Subtotal	(max. 214)						38
B. OWNER PHILOSOPHIES								
B1	Reliability Philosophy	0	1	5	10	14	18	1
B2	Maintenance Philosophy	0	1	5	9	12	16	1
B3	Operating Philosophy	0	1	5	8	12	15	1
B4	Design Philosophy	0	1	6	10	14	19	6
	Subtotal	(max. 68)						9
PROJECT REQUIREMENTS								
C1	Value Analysis Process	0	1	6	10	14	19	6
C2	Project Design Criteria	0	1	7	13	18	24	7
C3	Evaluation of Existing Facilities	0	2	7	13	19	24	13
C4	Scope of Work Overview	0	1	5	9	13	17	5
C5	Project Schedule	0	1	6	11	15	20	2
C6	Project Cost Estimate	0	2	8	15	21	27	8
	Subtotal	(max. 131)						41
	Section I Total	(max. 413)						88

Figure 3. Excerpt from PDRI-CG Score Sheet.

NESU Portsmouth's Partnership in International Education

by EM2 Jennifer Skurski

Under the sponsorship of the State Department's Security Assistance Program (SAPT), Training Center Yorktown hosts International Military Students (IMS) from many different countries. Engineering students attend either Electricians Mate or Machinery Technician A-School. Over the past 12 months, Naval Engineering Support Unit (NESU) Portsmouth has hosted more than 20 students from the Grenadian Coast Guard, the Ghanan Navy, the Lebanese Navy, the Sri Lankan Navy and the Royal Bahamas Defense Force with ranks ranging from Third Class Petty Officer to Master Chief. Select students, upon completion of A-School, travel to NESU Portsmouth, Virginia for systems familiarization and on the job training. This follow-on training is an essential portion of the International Military Student's education. NESU Portsmouth provides Mechanics and Electricians with exposure to the systems themselves, allowing the individuals to apply the training that they've received in a real world environment.

In an attempt to cater to the skill levels and desires of the students, NESU Portsmouth has had the International students actively involved in Main Diesel Engine Inspections, Generator Rebuilds, Diesel Engine Overhauls and Emergency Dewatering Pump Rebuilds. While many of the applications are not identical to those that the international Students will be facing in their home countries, the NESU tailors the experience to most effectively help them when they return home. Additionally, students are given familiarization training on the U.S.Coast Guard's Preventive Maintenance Schedule and its importance to system integrity.

The Coast Guard, over recent years, has put a renewed emphasis on Predictive Maintenance Technology, using vibration analysis, motor circuit analysis and infrared technology to determine when equipment actually needs maintenance vice relying on a time based system. Many of the concepts involved in Predictive Maintenance Technology are foreign to many of these students, so NESU provides the International Students an overview of the various concepts and equipment, with an emphasis on how its implementation increases reliability and decreases maintenance, thus reducing cost.

Royal Bahamian Defense Forces MK2 assists in the overhaul of Cummins VT903.

A sponsor from NESU Portsmouth is assigned to each International Student upon reporting aboard. Students are not only provided with on the job training during the workday, but during the evenings, students are invited to spend quality time with the sponsor and his or her family. This is an important part of the training. Students are able to come to understand what it means to be an American citizen. The International Students are witness to the positive impact we as citizens and Coasties have on the communities in which we live.

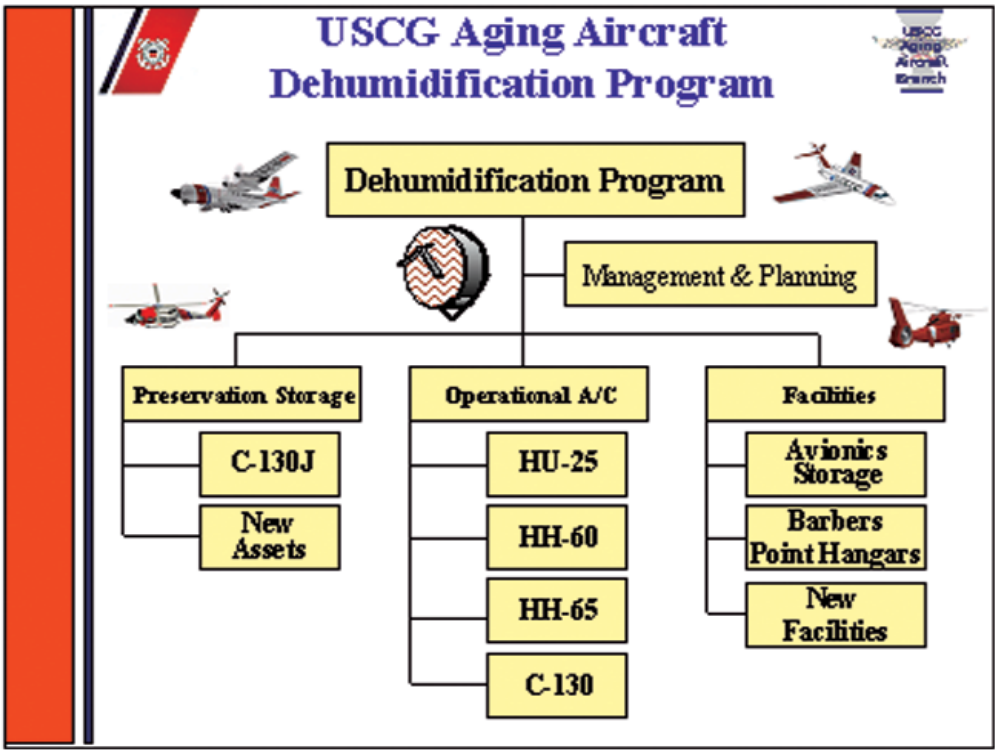
NESU Portsmouth has been presented with a unique opportunity to learn more about foreign cultures and military traditions. NESU Portsmouth's partnership in education has taught both the International Military Students and Coasties the importance of teamwork, understanding and camaraderie.

USCG Aging Aircraft Dehumidification Program (ARSC EISD Aging Aircraft Branch)

by Ron Holland
Aviation Solutions Division
Stanley Associates Inc.

The United States Coast Guard Aircraft Repair and Supply Center's (ARSC) Engineering and Industrial Support Division (EISD) is embracing dehumidification as one of the tools that can economically and effectively lessen the risk of corrosion, declining reliability and operational aging of USCG aeronautical assets. The inaugural meeting launching the Coast Guard's Aging Aircraft Dehumidification Program (AADP) was held at ARSC, Elizabeth City, North Carolina on 15 April 2003. An EISD steering group presented the AADP model at the meeting -- where the model was approved for use by the EISD Aging Aircraft Branch integrated engineering team. This team leverages structural integrity disciplines from Materials Engineering, Non Destructive Inspection (NDI), Corrosion Control, Wiring and Reliability programs in the support of Coast Guard aviation assets. The AADP model, illustrated in Figure 1, has proven to be both flexible and functional in providing a structure for the three major subprograms under the headings: Preservation Storage, Operational Assets and Facilities.

Figure 1. USCG Aging Aircraft Dehumanization Program Model.



The objective of the program is to reduce the aircraft's internal relative humidity and reduce corrosion and excessive moisture in electrical/avionics components, while increasing component reliability. The benefits

of dehumidification programs have been proven in DoD [Department of Defense] and foreign militaries. Figure 2 illustrates the effects of dehumidification on corrosion and avionics failures. For dehumidification efforts described in this article, approximately 40-50% relative humidity is the goal.

Preservation Storage Subprogram - The Aging Aircraft Branch's Corrosion Program, working with the C-130J Aircraft Project Office (APO), is looking at dehumidification applications for stored and operational C-130J aircraft. The C-130J aircraft is a new acquisition for the Coast Guard and represents an opportunity to apply a dehumidification program to a new product with high potential of exceeding anticipated longevity and systems reliability. Additional program results should be reduced operating costs coupled with reduced Total Ownership Cost (TOC).

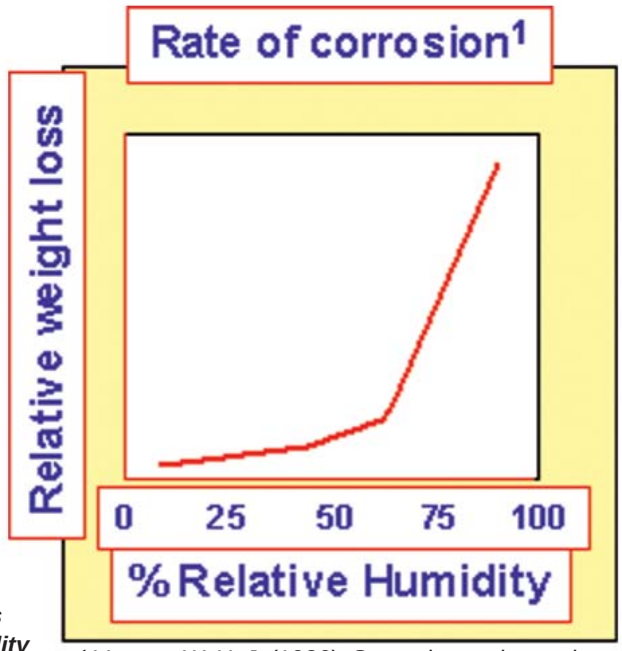
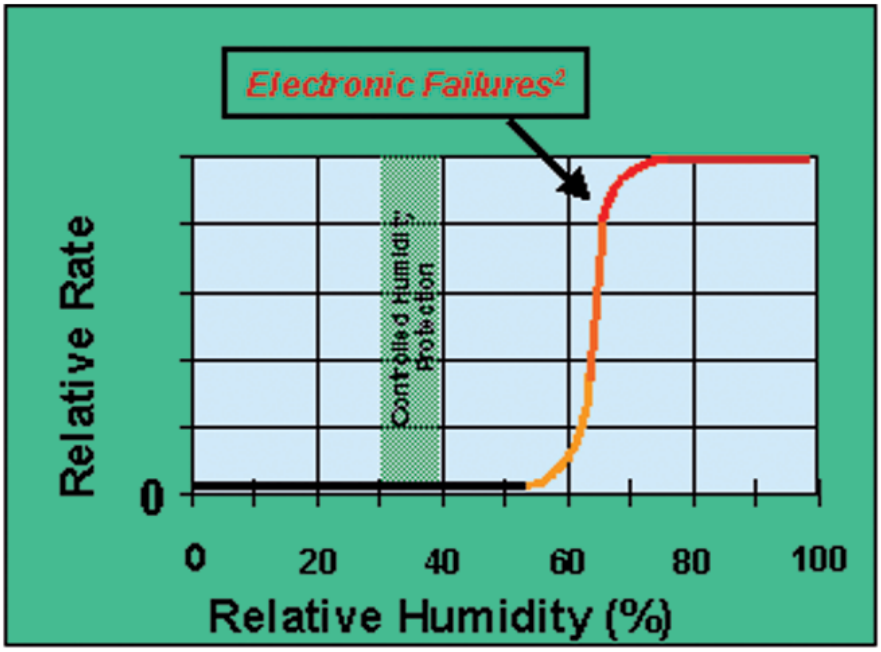


Figure 2. Effects of relative humidity on structures and avionics.

[1] Vernon, W. H. J. (1926). Second experimental report to the Atmospheric Research Committee, British Non-ferrous metals Research Association.

Operational Assets Subprogram - It's envisioned that this program will increase the reliability of operating assets at a reduced cost with minimum impact on the operator. Future savings would be recognized in the reduction of aircraft/component deterioration as well. Direct quantifiable savings may be realized by substantiating credits for air vehicle non-aging times, resulting in less Programmed Depot Maintenance (PDM) cycles, as well as increases in system/component reliability.



[2] Sandia National Laboratories

MCU-70 Dehumidifier Mobile Carts, acquired by ARSC, have been in use during field evaluation trials on HU-25 Falcon aircraft at Corpus Christi since October 2001 -- results from ongoing dehumidification field trials are positive. During non-operational/maintenance periods aircraft are internally dehumidified by connecting ducting from the cart to the aircraft's Environmental Control System (ECS) ram air inlet (Figure 3). An analysis of selected avionics failures, comparing representative periods of pre-dehumidification to dehumidification efforts, have shown substantial increases in avionics component reliability. Figure 4 provides a Program-of-Record summary of these efforts.

The Aging Aircraft Branch is leading the effort, along with USCG operational units, in evaluating electronic data loggers and portable dehumidification equipment. Ongoing tests and data feedback will help determine the most efficient and cost effective dehumidification system for Coast Guard use. The evaluation process provides a means of recording and reporting information for use in program execution metrics. Figure 5 illustrates one example of relative humidity and temperature recordings tracked on an HU-25 Falcon at Corpus Christi. The graph depicts actual relative humidity and temperature recordings during dehumidification application and flight events. Preliminary data indicates that measured dehumidification have not meet desired levels, this may indicate a need to increase dehumidification capacity. As

Figure 3. MCU-70 Mobile Cart attached to an HU-25 Falcon.

shown in Figure 4, resultant avionics reliability increases have been substantial even though actual relative humidity did not meet target.

With its success at Corpus Christi, the Aging Aircraft Branch is moving forward and looking at other Coast Guard aircraft. The Aging Aircraft Branch conducted site assessments at other Coast Guard Aviation Prime Units to determine aircraft operational compatibility with dehumidification equipment. The site assessment's overriding goal was to determine dehumidification equipment specifications to bring the aircraft's inside ambient relative humidity down to 40% within one hour. Additionally, the equipment must have the ability to maintain 40% relative humidity +/-10%, with no airframe modifications Moreover, to facilitate operational compatibility, the maximum time required to remove and install the equipment was specified at five minutes. This site assessment provides the Aging Aircraft Branch with minimum equipment specifications for each Coast Guard aircraft type. The next step is operational beta testing at each Prime Unit. Assuming successful testing, a Resource Proposal (RP) is being submitted for fleet implementation and logistical support.

Facilities Subprogram - The Aging Aircraft Branch, in conjunction with G-SEA (Office of Aeronautical Engineering), is working to quantify the corrosion impact of open bay aircraft hangars at Barbers Point, Hawaii, in the hopes of justifying the construction of new, closed bay hangar facilities. Barbers Point is one of the most severe corrosive environments compared to other Coast Guard air station locations, which presents a challenge to both resource and operational assets. The Coast Guard will benefit from placing aircraft and related components and equipment in a controlled dehumidification environment. Similarly, dehumidification equipment could be retrofited to any existing closed bay hangar.

The Aging Aircraft Branch is also considering installing dehumidification systems at supply and storage facilities housing avionics and related support equipment -- similar to the Army National Guard.

Summary - In summary, dehumidification works. The greatest challenge will be applying dehumidification to operational assets. Researching previous attempts at operationally employing dehumidification systems into U.S. and foreign military aircraft has revealed a common stumbling block -- ease-of-use. With this in mind, the Aging Aircraft Branch has set the aforementioned five-minute install/remove process as one of its criteria. Success of prototype efforts would have to satisfy the "How does this program benefit all?" It is envisioned

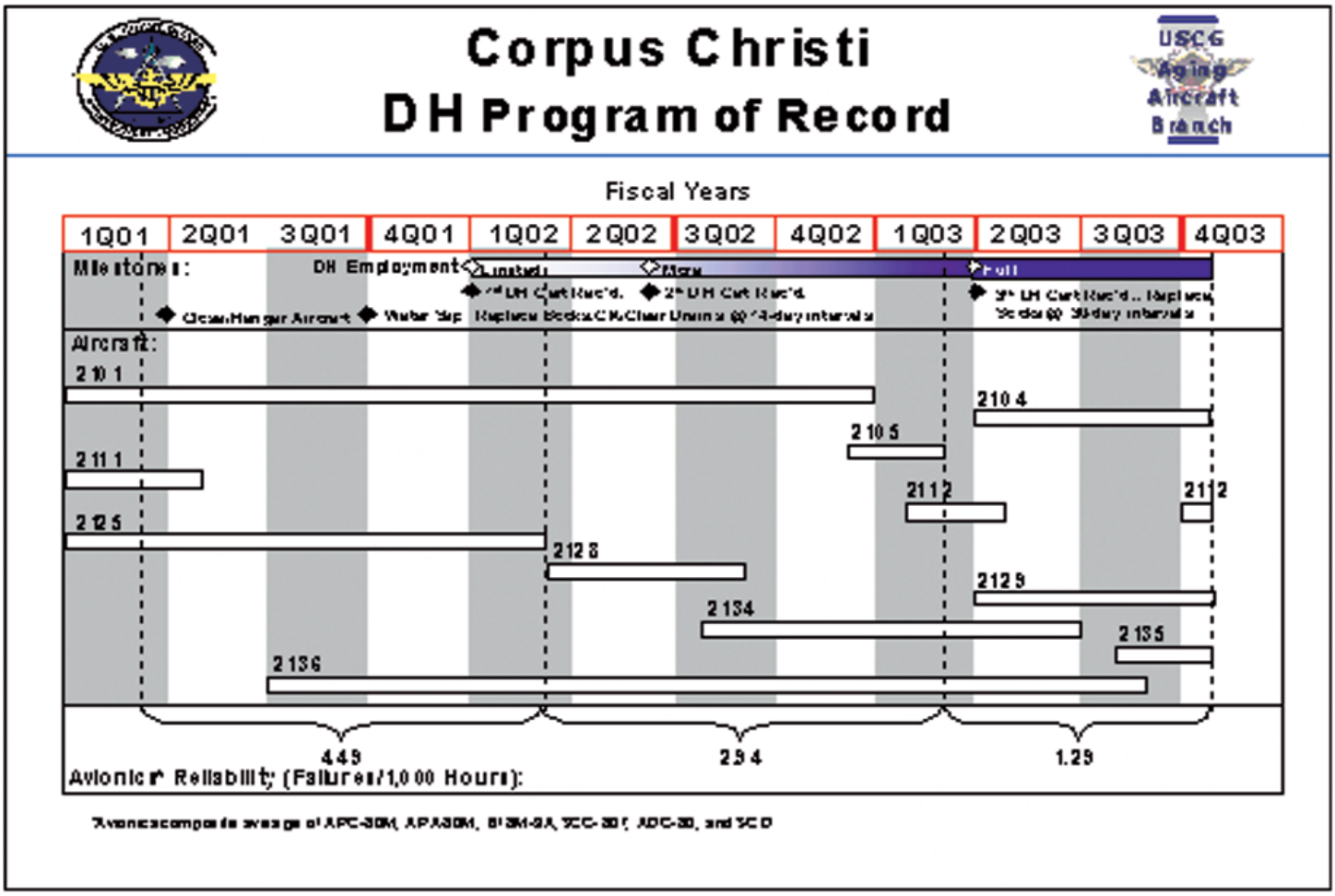


Figure 4. Corpus Christi Dehumidification Field Trial Program-of-Record.

that improved availability, reduced maintenance/operational costs and increased reliability will sell the program. Another important element in determining future deployment of dehumidification is data collection. The accuracy and completeness of reported data is very important in determining program success or failure. By-in-by all are a prerequisite for success.

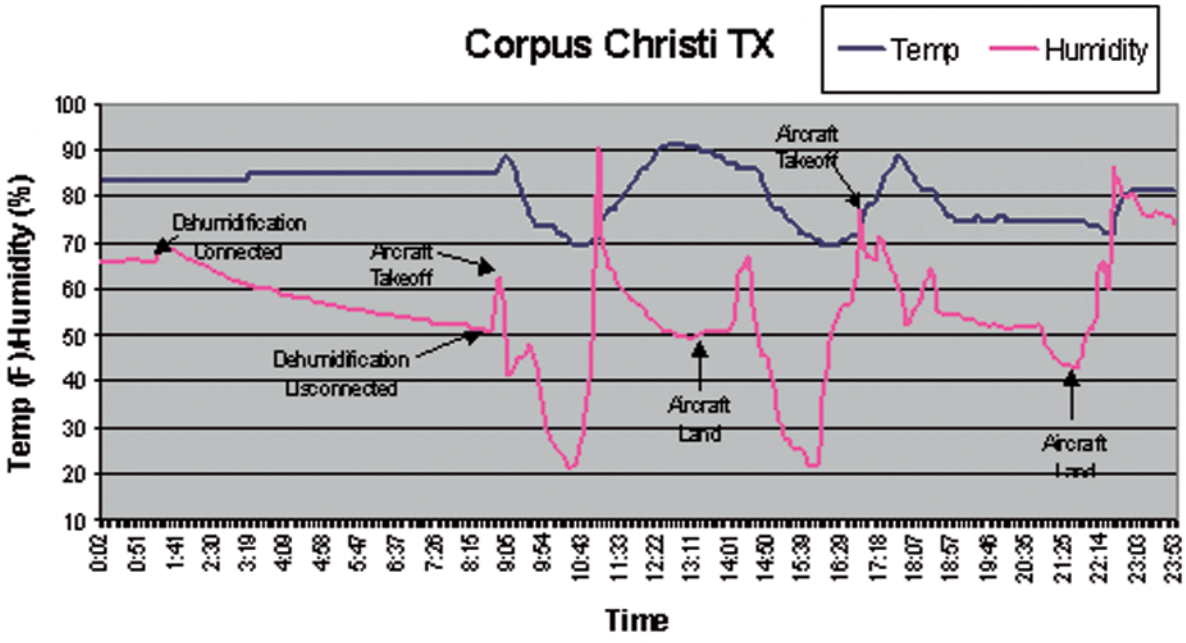
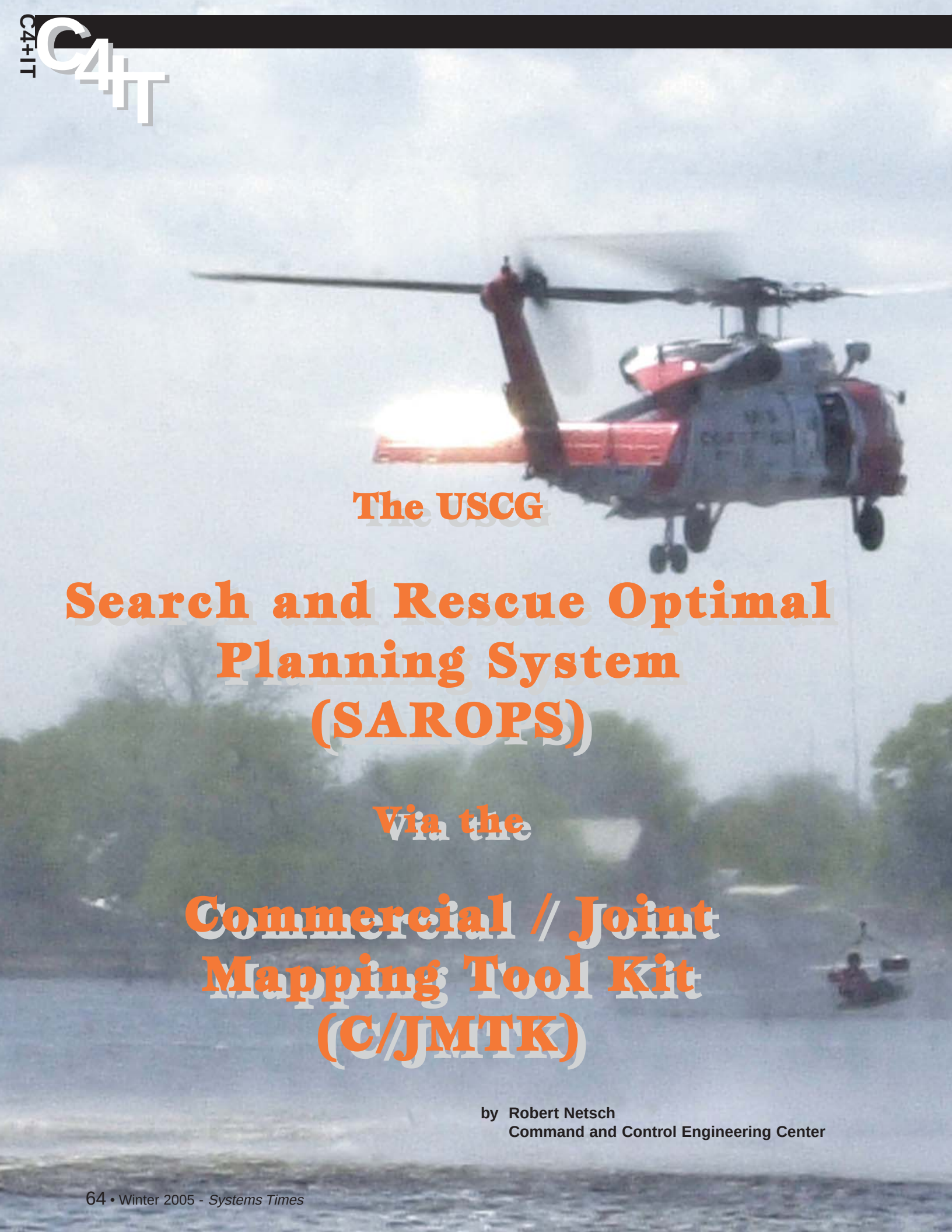
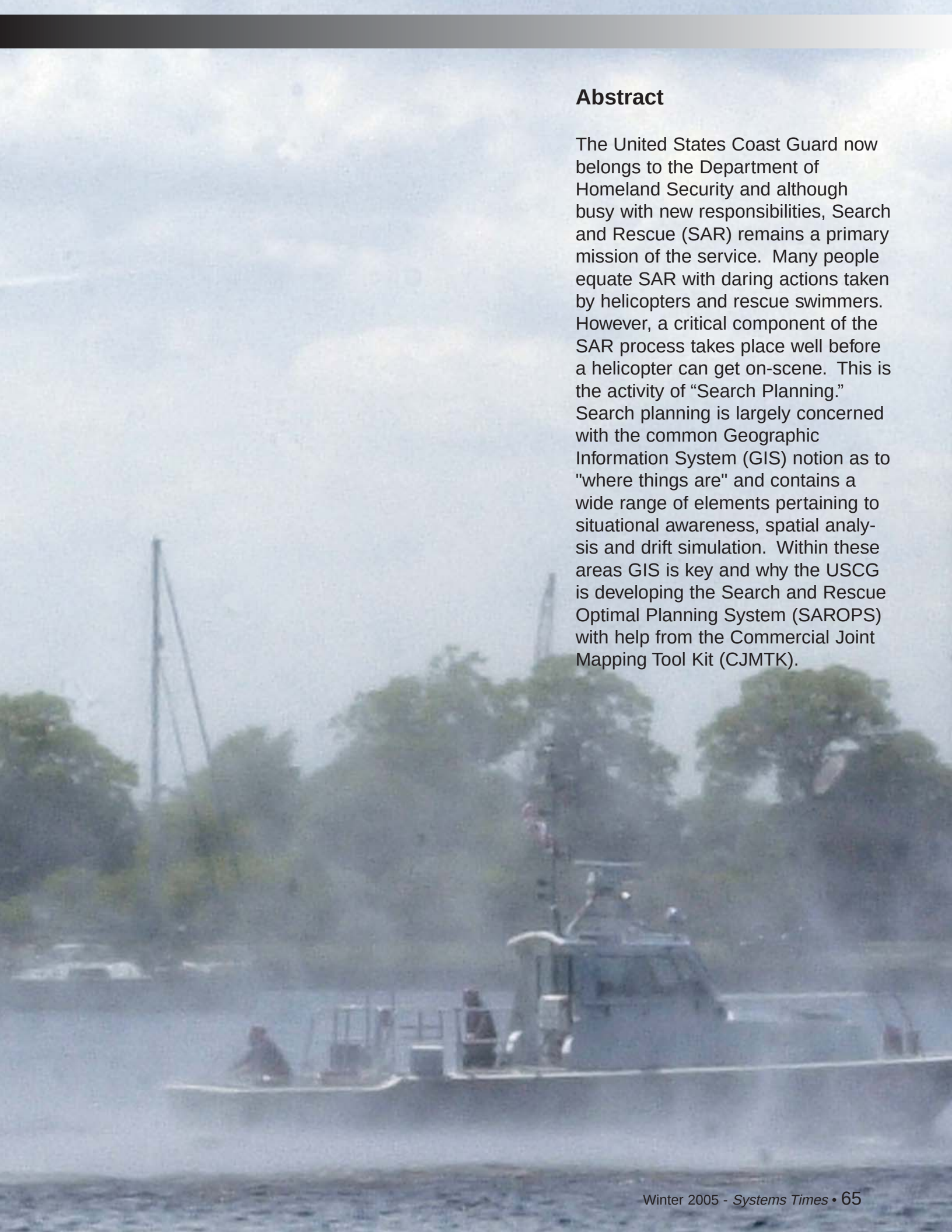


Figure 5. Corpus Christi HU-25 Data Logger Graph.



The USCG Search and Rescue Optimal Planning System (SAROPS) Via the Commercial / Joint Mapping Tool Kit (C/JMTK)

by Robert Netsch
Command and Control Engineering Center



Abstract

The United States Coast Guard now belongs to the Department of Homeland Security and although busy with new responsibilities, Search and Rescue (SAR) remains a primary mission of the service. Many people equate SAR with daring actions taken by helicopters and rescue swimmers. However, a critical component of the SAR process takes place well before a helicopter can get on-scene. This is the activity of “Search Planning.” Search planning is largely concerned with the common Geographic Information System (GIS) notion as to "where things are" and contains a wide range of elements pertaining to situational awareness, spatial analysis and drift simulation. Within these areas GIS is key and why the USCG is developing the Search and Rescue Optimal Planning System (SAROPS) with help from the Commercial Joint Mapping Tool Kit (CJMTK).

The U.S. Coast Guard has Command Centers in Puerto Rico, Guam, Hawaii, Alaska, in addition to those all along the coast of the mainland United States. These units are central to a wide range of operations ranging from Homeland Security to Marine Environmental Protection and serve as Rescue Coordination Centers (RCC) in support of Search and Rescue (SAR) operations. Although Geographic Information System (GIS) technology plays a key decision support role in all these functions, this article pertains to the discipline and technology of SAR planning.

For the most part, September 10th had been an unremarkable day, except that a disturbance had begun to form in the warm waters off Cape Hatteras, North Carolina. The low-pressure cell showed surprising strength in its rapid development from a typical Nor-Easter to a serious hurricane.

LT Tom Thompson, of the USCG Atlantic Area/District 5 (LANT/D5) Command Center, was busy with normal duties, and kept abreast of the degrading weather by checking buoy reports, satellite imagery and National Weather Service Marine broadcasts. It was 1630 local time, a C-130 Hercules had just returned from a coastal patrol to Air Station (AIRSTA) Elizabeth City, and was uploading sightings of interest into the Common Operation Picture (COP) database. The upload had been completed when the Group Cape Hatteras Operations Officer (OPS) heard from the F/V MARINE; she had just picked up a partial distress call: "MAYDAY - MAYDAY - MAYDAY THIS IS WILLIAM LEWIS HERNDON OF THE S/V AMERICANA. WE ARE TAKING ON WATER AT POSITION 35-15N …" OPS recorded and forwarded the information to LT Thompson at LANT/D5 who would assume the role of SAR Mission Coordinator (SMC). The area Hi-Sites (Buxton, Oregon Inlet, Cedar Isle) had no record of the AMERICANA distress call. At this point all that was known was the position of the F/V MARINE, the partial coordinates provided by the AMERICANA and the lack of reception at the Hi-Sites. This incomplete distress call was to be the one and only radio communication from AMERICANA. At first glance there wasn't a lot to go on.

In 2003 the USCG received a total of over 30,000 calls for assistance. Many of these calls were easily responded to and required nearly no searching. However, 5-10% of the calls became significant SAR events; resulting in action by multiple land, air and sea units. Every day, on average in 2003, the USCG assisted 136 persons in dis-

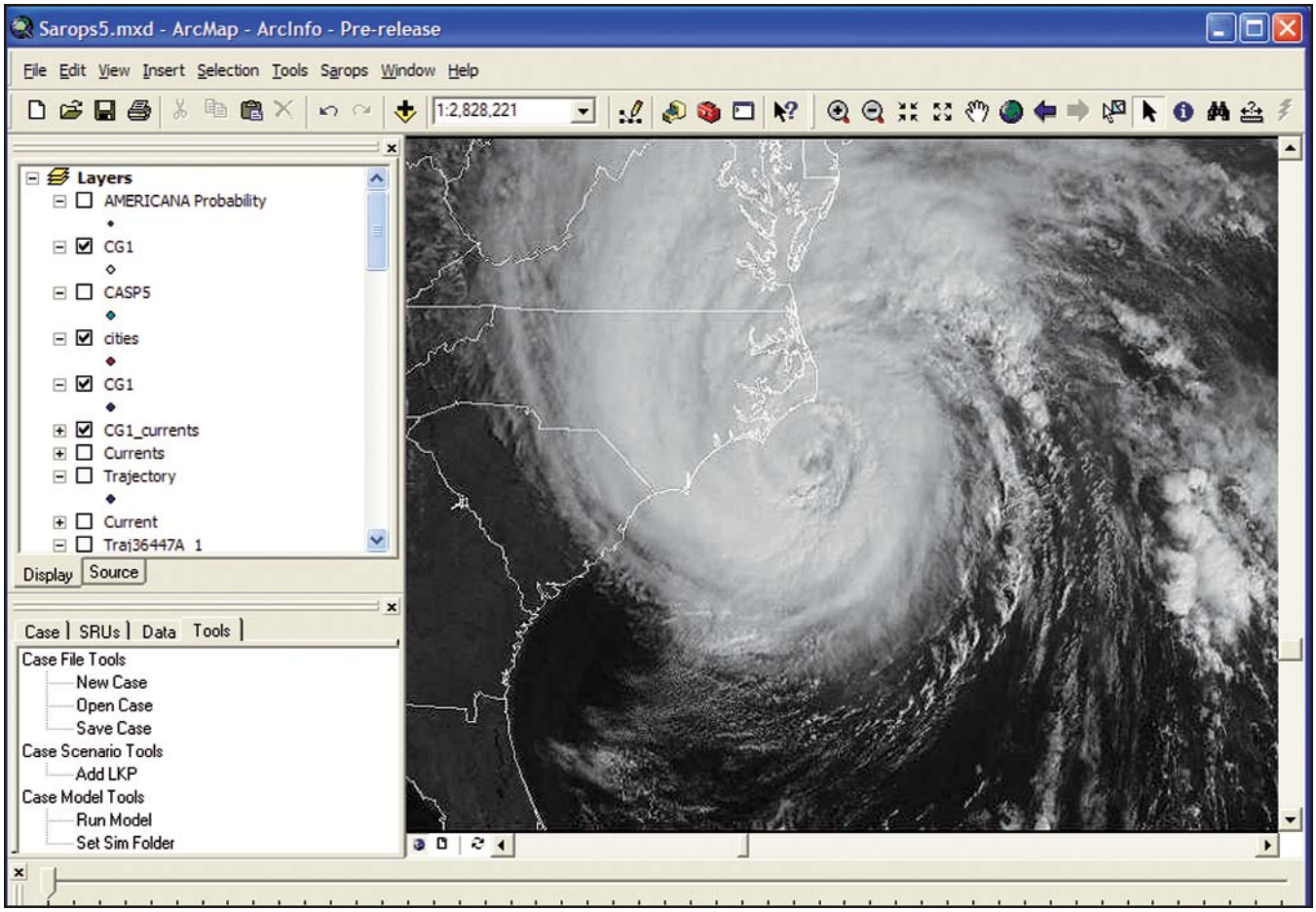


Figure 1. Mid Atlantic Hurricane.

Figure 2. USCG Search and Rescue aircraft.

"MAYDAY - MAYDAY - MAYDAY THIS IS WILLIAM LEWIS HERNDON OF THE S/V AMERICANA. WE ARE TAKING ON WATER AT POSITION 35-15N …"

tress and saved 11 lives. An open ocean case with a long drift interval (the time between a search object's Last Known Position (LKP) and the searcher's on scene time) can easily require the expenditure of hundreds of search hours and hundreds of thousands, even millions, of dollars. Determining how and where to place the available search assets to maximize the overall effective search plan is the subject matter of Search Planning. The most effective search plan is the one that continuously maximizes the probability of finding the search object as each hour passes. Broken into its most simple form, Search Planning consists of Situation Awareness (ascertaining what happened where and when), Search Object drift modeling (how has wind and water current affected the search object over the drift interval) and Effort Allocation (how best to spread finite aircraft and vessel hours over a search area).

The Search and Rescue Optimal Planning System (SAROPS) is an information system being designed to support Situation Awareness, Drift Modeling and Optimal Allocation of Resources. SAROPS is built upon the Commercial Joint Mapping Tool Kit (C/JMTK), a government initiative to provide enhanced ArcGIS 9 functionality to support Command and Control system development. The open SAROPS architecture can accommodate a wide range of third party extensions to support non-SAR mission areas. SAROPS itself contains an environmental data subsystem built upon ArcSDE technology; a Monte-Carlo particle simulation engine implemented in Java and an extended ArcMap user interface. When deployed, SAROPS will allow the USCG to be even more successful in the timely rescue of lives and property in coastal waters and on the high seas.

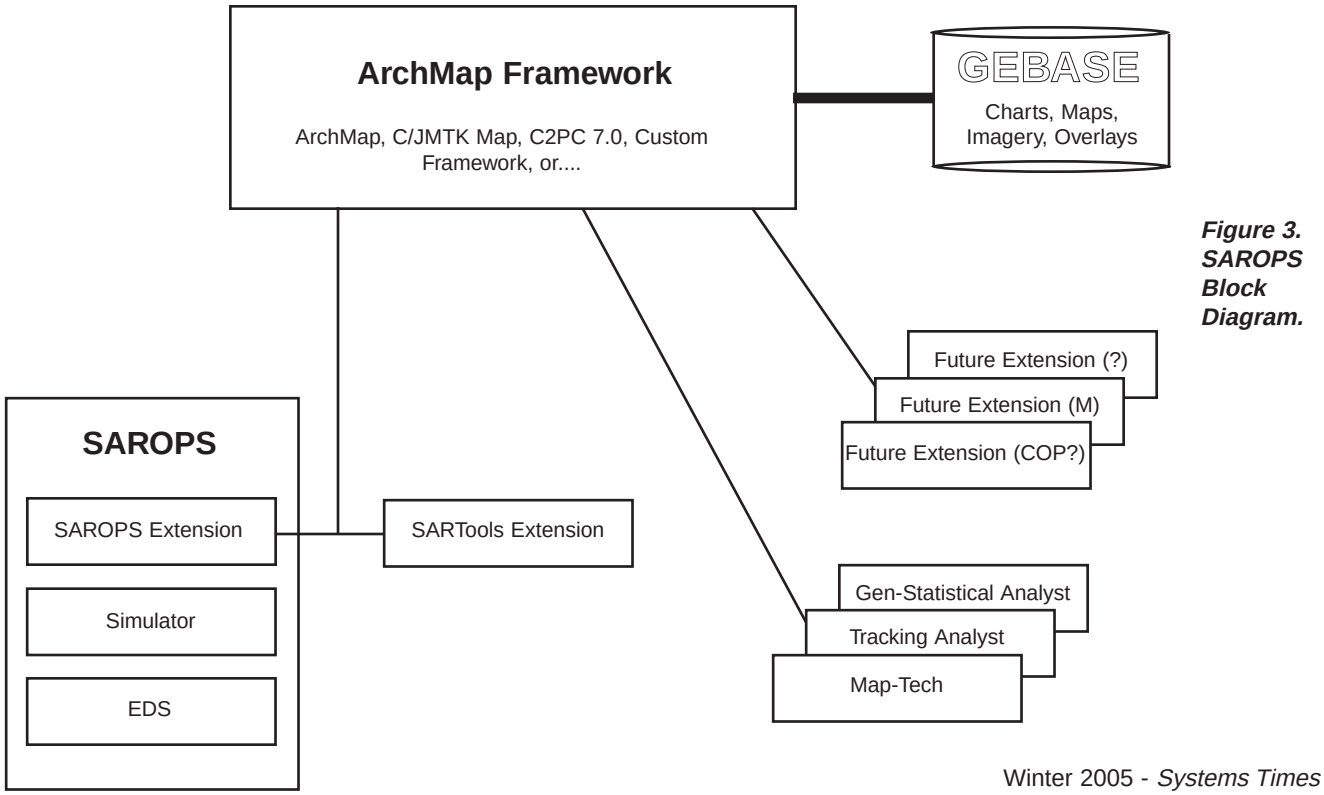


Figure 3. SAROPS Block Diagram.

LT Tom Thompson, a forward thinking GIS enthusiast, knew that overlays on a Geographic Information System are extremely valuable in the analysis of the diverse information received by a SAR Controller. Within minutes he had assembled a Venn diagram style radio coverage graphic to represent where the message was received, Hi-Sites where the message was not detected and the key information contained within the message. LT Thompson selected black range rings to show the nominal coverage of the USCG Hi-Sites. Since these Hi-Sites did not pick up the AMERICANA distress call, it is probable that the AMERICANA was outside of their reception ranges. The maximum range at which the MARINE could have received the distress call was judged to be about 20 Nautical Mile (NM). This area is depicted with a red range ring, centered on the MARINE. The MARINE range ring minus the Hi-Site Buxton range ring provides a geographic representation of the area from which the call was probably made. Lastly, the AMERICANA provided its Latitude prior to transmission loss. Plotting this parallel of latitude within the remaining red region gives an even better probable location for the source of the distress call.

Emergency Position Indicating Radio Beacons (EPIRBs) are used as distress signaling devices by most ocean going vessels. The beacons are attached to brackets that allow the beacon to automatically release and activate when a vessel sinks. The beacon then sends a signal that is picked up by satellite and forwarded to the Coast Guard.

At 102330Z SEP 06 the SAROPS system flashed an alert and plotted the position showing the location of the AMERICANA 406 Mhz EPIRB. Contained in the EPIRB's SARSAT message was the registration information that identified the vessel as S/V AMERICANA owned by W.L. Herndon of Virginia. A phone call and database query confirmed that the vessel was a 42' deep keel cruising style sail boat en route from Panama to New York, with 5 persons aboard. LT Thompson considered this news a solid correlation with the earlier MAYDAY, excepting that the SARSAT position provided was almost 10 miles SW from where his earlier analysis predicted. LT Thompson knew that his evening was just getting started, as the poor weather would not allow an immediate "Hit it Hard and Hit it Fast" launch. Deployment of resources would need to wait until first light. In the mean time, he would monitor the situation (i.e., weather, communications and available resources), issue an Urgent Marine Information Broadcast (UMIB), brief his Chain of Command (CoC) and plan the first light search. Unfortunately, the weather was likely to change little as the storm was predicted to stall off the coast. The EPIRB was also uncooperative as there was only one additional message that evening which did correspond to its earlier position and his earlier analysis once adjusted for set and drift.

The situation was not great but it was understood. Historically this has not always been the case, but with modern GIS tools and adequate data feeds the picture was clear. The storm was raging. The vessel in distress was the AMERICANA with a crew of 5. The LKP was 35-05N 074-57W at 102350Z SEP 06. The UMIB was out. CDR Frost, his boss, was briefed. AIRSTA E-City had fixed and rotary wing aircraft ready for morning operations. Also available was a 123' Patrol Boat from Portsmouth and a 47' Motor Life Boat from Station Oregon Inlet. The time between the LKP and the Mean

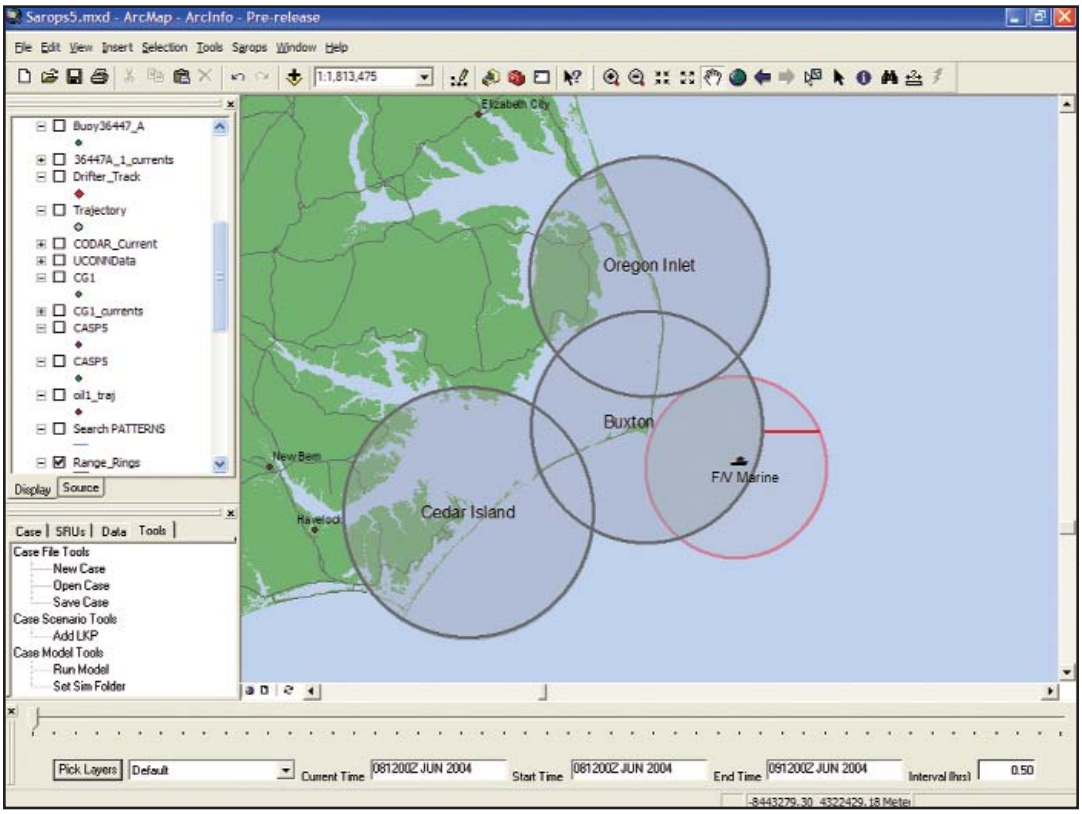


Figure 4. SAROPS Venn Diagram.

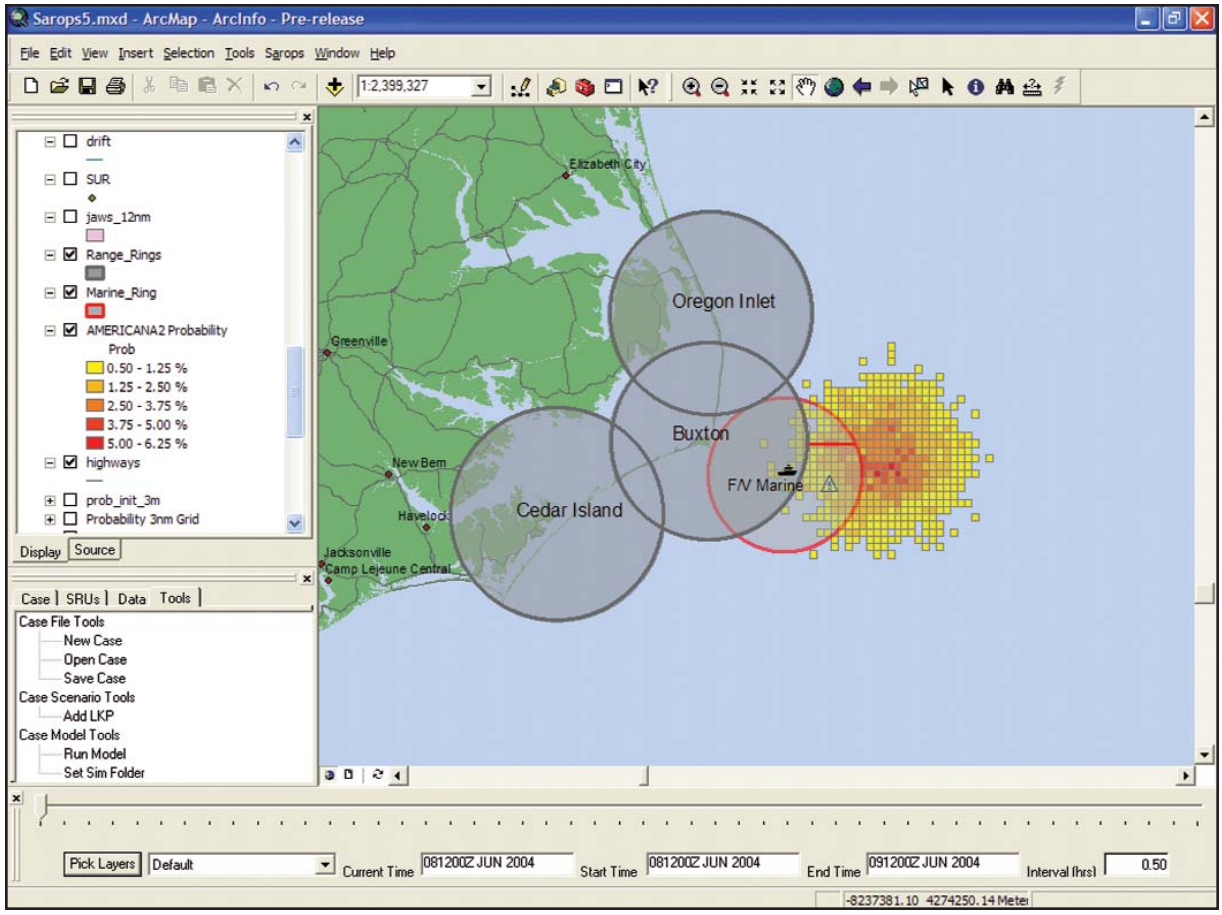


Figure 5. SAROPS Probability Distribution Map.

Search Time (MST) was roughly 17 hours. This isn't huge as far as drift intervals go, but with 60+ knot winds and heavy seas there would be quite a range in possible drifts. LT Thompson used SAROPS to review and visualize the situation and began formulating a plan to determine which resources would need to head out in the morning.

LT Thompson activated the SAROPS "Wizard" to enter LKP, incident time, vessel type, drift interval, Hurricane Hunter Observations and available resources. He chose to consider two possible situations; one which focused on the vessel and another based on a life raft. The fact that there had been SARSAT messages (although limited) and no further radio communications led him to think that the AMERICANA may have been lost. The SAROPS extension stored the case within an XML data structure and fed it to the drift simulator. The simulator ran two thousand replications, each of which represented how the vessel might drift given a particular set of environmental inputs and probabilistic variability. The simulator then returned a shape file to the GUI that represented a probability density distribution of the vessel and raft locations at the mean time of the next day's search (MST). The simulated plot looked reasonable but not necessarily intuitive to LT Thompson as the wind was clocking from NE to W and the Gulf Stream current from the SE. The result was an area approximately 50 miles long by 60 miles wide centered about 45 NM ESE of Cape Point. A defined probability map was half the battle, or at least LT Thompson's battle, now he needed to determine how best aircraft and cutters should search most effectively.

During the night the cutters got underway and the air crews prepared for flight. The hurricane tracked to the south and inland, which meant that clearing winds would come around from the W by morning. This would help to drop the sea state and allow better visibility.

Environmental factors in combination with the search object and search craft characteristics are fundamental in determining search pattern track spacing. There is an inherent trade off in search planning between how thoroughly an area is searched and the size of the area. On one hand, a search area with a high coverage factor yields a high Probability Of Detection (POD). The problem is that the size of the area that can be searched with a high coverage factor is smaller than the size of an area searched with a lower coverage factor. If the search object isn't within that area it will not be found, period. On the other hand, a lower coverage factor allows a greater area to be searched; the problem here is that the search object could be overlooked. Fortunately, the SAROPS simulator optimizes the coverage factor (i.e., the search patterns' track spacing) to maximize the Probability of Success (POS). POS is the product of

POD and the probability the search object is in the area being searched (i.e., the Probability of Containment, (POC)).

LT Thompson next entered available resources with the Wizard and let the simulator compute the optimized search patterns. LT Thompson performed minor adjustments given his practical experience to create a Search Action Plan (SAP) that met his satisfaction.

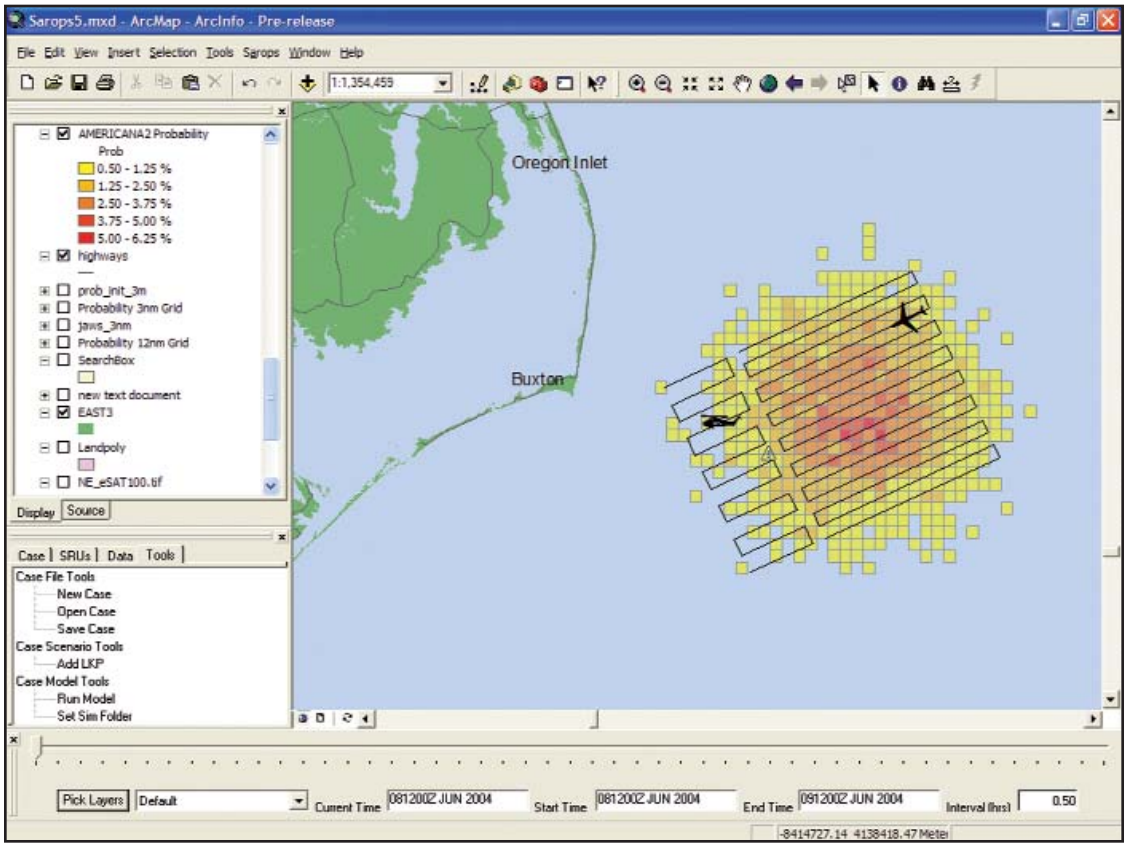


Figure 6. SAROPS Search Patterns.

The SAP, with pattern summary reports, were sent out and entered into the search craft's respective navigation systems. The Helo and C-130 both ran parallel searches and a 123' cutter moved on scene to lend assistance. On its third leg the Helo spotted the vessel with all aboard. There was no engine activity, but a storm jib was up and sea anchor deployed. These (unexpected) factors combined with a persistent landward tack edged the AMERICANA to the eastern edge of the probability map. The engine had been flooded and electrical system fouled early in the storm. The EPIRB was washed overboard during a roll and had self activated; the cause of its intermittent and short-lived signal was not known. The Helo crew determined the AMERICANA was no longer in immediate danger; therefore, no rescue swimmer was deployed and no persons evacuated. Instead, a pump was dropped; the Helo was relieved by the C-130 who circled overhead until the WPB-123 arrived 90 minutes later. With the hull pumped, Captain Herndon was able to raise partial sail and return to port under escort of the WPB-123 without further event.

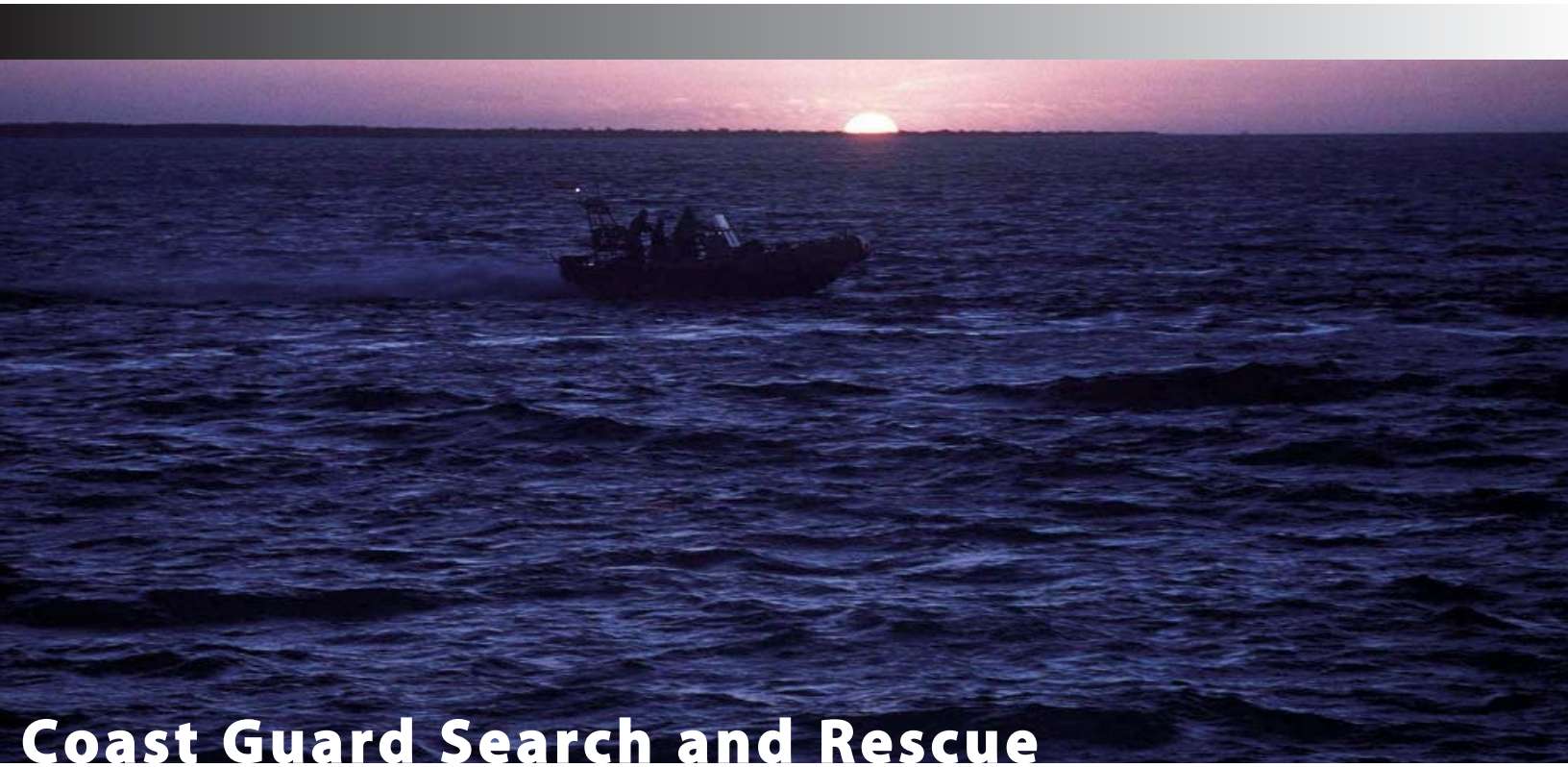
Acknowledgements

Readers may notice similarities between this story and the loss of the SS CENTRAL AMERICA in the same general area on September 11, 1857. The SS CENTRAL AMERICA had carried nearly 600 passengers and 20 tons of California gold. In the late 1980s the wreck was discovered in over 8,000 feet of water (using a predecessor to SAROPS to plan the high-tech sonar search). For those not familiar with this historical event and later salvage, the book, *Ship of Gold in the Deep Blue Sea* by Gary Kinder is highly recommended reading.

The SAROPS system is currently under development and scheduled for deployment in 2006. Northrop Grumman, a key contributor to the USCG's C4I systems is the prime contractor and responsible for overall integration of SAROPS. Applied Science Associates (ASA Inc.) is responsible for the Environmental Data Server and GUI. Chris Galagan of ASA created the screen captures shown above with an early SAROPS prototype. Metron Inc. is developing the SAROPS simulator engine under the watchful eye of Dr. Larry Stone. Dr. Stone is the mathematician responsible for the probability maps that led to the location of the SS CENTRAL AMERICA in 1987 by the Columbus Discovery Group, formed and led by Tommy Thompson.

End Notes

The satellite image shown above is of hurricane Isabel, which ravaged Hatteras Village, North Carolina and impacted most of the mid-Atlantic Coast in September



Coast Guard Search and Rescue

2003. Given today's Coast Guard and modern technology, many more, possibly even all of the 425 lives tragically lost in 1857, would have been saved. As it was, passing vessels were able to save 150+ lives, otherwise all would have perished and no one would have known of the SS CENTRAL AMERICA's loss until she became overdue in New York. The town of Herndon, Virginia is named in honor of Captain Herndon of the SS CENTRAL AMERICA, who went down with the ship after extraordinary efforts to save as many of the passengers and crew as possible. The fictitious, but not farfetched, example above reflects common aspects of the many SAR operations expertly conducted by the U.S. Coast Guard.

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Author Information

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WLB/WLM ECPINS© USCG 5.0 Upgrade

by LT Steve Bird
Command and Control Engineering Center

The Command and Control Engineering Center (C2CEN) is in the testing stages of an upgrade to the Electronic Charting Precise Integrated Navigation System (ECPINS) on the Juniper and Keeper Class buoy tenders. While the current ECPINS version was the best available during the acquisition and construction of the Coast Guard's newest black hulls, a number of performance and reliability issues have been raised by the fleet and will require a major overhaul. First, the failure rate of the Versa Marine Eurocard (VME) hardware has increased significantly. At the same time, the manufacturer stopped supporting the VME hardware, greatly reducing the Coast Guard's ability to purchase new spares or repair failed components. Additionally, the VME system has inadequate memory to process and display newer, data-rich electronic charts. This resulted in charts being split into smaller areas to compensate for the problem. Unfortunately, chart splits cause lengthy delays for chart loading and sometimes occur at unsafe locations (such as Boston Harbor and Charleston) which increase navigational risks. ECPINS USCG 5.0 solves these problems and provides several new functions to the fleet.

During the past year, while awaiting release of ECPINS USCG 5.0 software, C2CEN engineers were able to get a jump-start on prototyping the new hardware baseline using ECPINS USCG 4.2. The new hardware baseline ECPINS USCG 4.2 removes the existing Route Planning and Route Monitoring VME chassis. The VME is replaced by two PCs that serve as route planning and route monitoring computers. These changes were prototyped on CGC CYPRESS, CGC JUNIPER and CGC JOSHUA APPLEBY, and were highly successful. After evaluating the prototypes, Engineering Changes were approved for the WLB-225 and WLM-175 platforms and CGC WILLOW, CGC SEQUOIA, CGC MAPLE and CGC OAK were chosen for upgrade to resolve outstanding issues with their VME systems. With ECPINS USCG 5.0 finally delivered, no further ECPINS USCG 4.2 installations are planned.

ECPINS USCG 5.0 provides several new functions and system improvements besides removing the VMEs and the split charts on the ECPINS USCG system. The major functional improvement of the upgraded system is the use of all official U.S. Hydrographic Office charts. The ability to use these charts is required for paperless navigation in accordance with COMDTINST M3530.2A. Other functional improvements include: expanded danger zones, visual fixing, multi-chart loading and chart management tools. System improvements include faster processor speeds and considerably increased memory. The sum of these improvements is a faster, more complete navigation tool.

From a maintenance standpoint, troubleshooting efforts will be simplified by the replacement of complicated VME circuit boards, backplanes and power supplies with a standard PC. In addition, the replacement of the ECPINS VME with PCs will result in a dramatic decrease in the cost of spare parts, $40k per vessel for VME compared to $5k per vessel for PC, and an increase in parts availability. Finally, system reliability and availability will increase with the elimination of VME "lock-ups" and improved mean time between failures.

C2CEN received ECPINS USCG 5.0 in September 2004. After receiving the software, C2CEN engineers began developing detailed test procedures for use during acceptance testing. This process will ensure consistency of functionality across different hardware baselines. Once the software is thoroughly tested, final acceptance of the software will be made and C2CEN will begin ECPINS USCG 5.0 installations throughout the WLB/WLM fleet.

Roll out of ECPINS USCG 5.0 will include C2CEN personnel scheduling a visit to each buoy tender for installation. At the start of the visit, the team will conduct a verification of the current system operation. They will then remove the old, unneeded hardware before installing the new system components. ECPINS USCG 5.0 software will then be loaded and the system configured. After installation on a cutter, a third party contractor conducts a System Operational Verification Test (SOVT) to ensure that the system is operating correctly and the hardware installation is complete. Concurrent with the installation, C2CEN instructors hold classroom style training for the crew using a portable classroom consisting of more than a dozen laptops connected via wireless LAN. The conclusion of the visit is an underway period for final operational testing and hands on training.

C2CEN anticipates ECPINS USCG 5.0 installations to begin during the second quarter of Fiscal Year 2005. Project Point of Contact is LT Steve Bird at (757) 686-4279.

SECTOR COMMAND CENTER (SCC) SYSTEM

by **LT John V. Chang**
Command and Control Engineering Center

Sector Command Center (SCC) System

The installation of the core Command and Control (C2) computer suite for the newly implemented Sector Command Centers began this summer at SCC Miami. SCC Miami was selected as the test platform for this Department of Homeland Security (DHS), Office of Command and Control Architecture (G-OCC) and Maritime Domain Awareness Directorate (G-OC/MDA) sponsored "Hawkeye" project. Since its installation in Miami, the SCC system was rapidly deployed to support Homeland Security for the summer's Democratic and Republican National Conventions held in Boston and New York, respectively. Installation of this system at SCC-J Hampton Roads, a joint Coast Guard and Navy command center, was completed at the end of September [2004]. Installation of the SCC system at the Department of Justice multi-agency "Seahawk" project in Charleston, South Carolina, begun in the fall of 2004.

Computer Suite and Software:

The SCC System is a spiral development C2 system based on Defense Information System Agency (DISA) Common Operating Environment (COE) v4.7 and a number of C2 applications currently supported at C2CEN. The computer suite is comprised of a Solaris v240 server and Solaris Sunblade 2000 workstations running Solaris OS 8 and the DISA COE version 4.7. Two Dell PowerEdge 1750s function as the system's database server and web server. In addition to this core computer system, the SCC system incorporates Advanced Encryption Standard (AES) 128-bit encrypted Blue Force Tracking mobile units that consist of a modified SeaTex Automatic Identification System (AIS) transponders and ruggedized Panasonic Tablet PCs. Another component of this system is the MDA Web-Client that gives port partners real-time access to current vessels, security zone alarms and database information.

Command and Control Functionality

The command and control system enables the operator to view real-time tracks on charts. Functions include security zone alarms, camera slewing and blue force tracking to gain an increased maritime domain awareness within the Sector's Area of Responsibility. These tracks are exported to the Coast Guard's Common Operational Picture (COP) and also to multi-level access MDA Web-Client.

- ❒ Alarm Zones: On the Chart Display, the operator can designate two types of

alarm zones, static and moving. When a zone is breached by a track, a red circle encompasses the violating track and an alert is triggered. Alerts can be viewed at the operators workstation and via the Web-Client. Future development includes sending this alert message to cell phones via text messaging.

- ❒ Auto-Acquisition Zones: When a radar contact meeting the zone parameter settings enters the zone, the system automatically acquires the radar video and begins to track the vessel as a radar track.

- ❒ Camera Slewing: The operator has the ability to designate any track on plot to be viewed by the camera. The camera will slew to the particular track and follow it as it moves throughout the Area of Responsibility (AoR). There is also a red line on the display to denote the bearing of each camera.

- ❒ Blue Force Tracking (BFT): Blue Force Assets (i.e., USCG cutters and small boats, local law enforcement boats, federal agency boats, USCG Auxiliary boats) can be tracked by the system. This sub-system consists of mobile AIS units and a tablet PC to be installed either permanently or temporarily as a portable unit on these BF assets. There are three operating modes for these mobile units: Receive-Only, Unencrypted Transmission and Encrypted Transmission. The BF asset's information (position, course, speed) is encrypted and sent to the shore-based SCC system. The SCC system is able to track the BFT along with all other tracks on its chart display. This sub-system also allows for text messaging in unencrypted or encrypted modes to be sent and received between the SCC and BFTs.

- ❒ Track Export: Track Export data to the national COP includes the name of the vessel, the type of sensor tracking the vessel (AIS, radar or correlated AIS/radar), its Maritime Mobile Service Identification (MMSI) number (if an AIS transmitting vessel), position, and course and speed over ground.

Database

The vessel database and the facility database are initially populated using the Marine Information Safety and Law Enforcement System (MISLE) database. The transit database correlates information from the vessel and facilities databases when a vessel transits into, out of or within the AOR. Future development includes the capability of anomaly detection based on past transits or deviations from a current transit and live updates with MISLE.

MDA Web-Client

"Port Partners" such as harbor masters, pilot associations and local law enforcement can view a web-based version of the SCC system from any computer with an Internet connection. Alerts are sent to Web-Client users when alarm zones have been breached. A Bulletin Board System (BBS) allows for sharing of documentation or images. Password associated privileges allow certain users to edit database information, such as notice of arrivals or vessel information.

The SCC Web-Client also displays near real-time camera images (although the operator at the center maintains control of the camera). The chart display on the Web-Client denotes the type of sensor tracking the particular vessel.

Sensors

The Sector Command Center system utilizes a variety of sensor data from multiple optical (medium and long range) and infrared (long range) cameras, radars and AIS base stations to provide continuous port and coastal surveillance.

- ❒ Automatic Identification System (AIS) Base Stations: receives AIS transmissions from equipped commercial vessels and Blue Force assets. Future development includes capability to send and receive text messages via AIS. System capable of integrating multiple base stations throughout the Area of Responsibility.

- ❒ Radars: System is capable of integrating several radars into the system by using a commercial system tracker.

- ❒ Cameras: Optical Medium Range, Optical Long Range and Infrared Long Range Cameras with Pan/Tilt/Zoom capabilities are incorporated into the system.

SCC has the capability of tracking vessels of interest by using multiple sensors. Not only can the operator track a vessel using one of these sensors, but the functionality of the system also provides a means to integrate two or more types of sensors to a particular track. For example, an AIS equipped vessel can also be tracked through radar and the system will connect these two tracks into one correlated track.

The system is scalable for each port. Multiple radars, AIS base stations and cameras can be added to larger ports or ports with a need for increased surveillance. The system's open architecture supports the addition of new sensor integration.

Development continues at C2CEN while future installs throughout the country have been planned. For further information concerning the Sector Command Center system, contact Jim Long (jlong@c2cen.uscg.mil).

Battery Charger Replacement:

DGPS-EC-001

Plug and Play, *Walk Away!*

by CWO3 Eric Shofner
Command and Control Engineering Center

How many hours, days, weeks does it take to align the legacy Maritime DGPS (V)1 battery charging system ... one, two, three? The existing charging system is built into the Southern Avionics SC-1000 DGPS transmitter cabinet, as a standalone integrated function, which charges 12 size 8G8D 12VDC 200 amp-hour batteries connected in series. The resultant total battery voltage, 144VDC pre-charge and 165VDC nominal post-charge, provides back-up secondary power support, up to 24 hours, to the SC-1000 transmitter and DGPS "Blue Rack" electronic equipment, which includes Reference Stations, Integrity Monitors, a Cisco Router and data communications equipment.

So, how long does it take to align the legacy integrated charging system? The answer is, it depends. Typically, at least one week, and sometimes two weeks or more are needed to properly adjust the old legacy charging system, which equates to at least 80 to possibly more than 200 precious man-hours, not including modest to significant travel time, and the drain to scarce unit travel, per-diem and other maintenance expenses.

Why does it take so long to align a simple battery charging system? The batteries often need to be "equalized" prior to achieving a successful battery charging alignment, which includes battery removal, individual battery discharging and re-charging, and re-installation. Only after all the batteries are fully discharged and

re-charged will the lengthy alignment procedure have a chance to succeed. Also, the legacy charging system is engineered to charge lead-acid batteries only. The standard Maritime DGPSD (V)1 batteries are gel-cel, not lead-acid. Gel-cel batteries require a higher charging voltage, at a lower current, which the legacy charging system does not provide. Another factor leading to premature battery failure is that the cables connecting one shelf to another are longer than the cables connecting one battery to the next on the same shelf. The longer cables add extra resistance, that affects the charging voltage and current, resulting in some batteries receiving more or less charging current than others, especially on each end of the longer cables, leading to premature battery failure and diminished back-up power sustainability.

Tired of replacing batteries every year or two, and of performing the tedious and meticulously laborious charging alignment procedure? Then stand easy, for relief is near! C2CEN, NAVCEN (Navigation Center) EAST/WEST and MLCPAC/MLCLANT (Maintenance and Logistics Command Atlantic and Pacific) have heard your request to improve the legacy charging system, or replace it with a more efficient and less labor-intensive charging system! The result of C2CEN's engineering study is DGPS Engineering Change (EC) - 001 to the Maritime GCF-C2-1216-DGPS(V)1 system.

DGPS-EC-001 replaces the legacy charger with three external Major Charge 48VDC/20 amp battery chargers (see Image 1). DGPS-EC-001 also permanently removes the SC-1000 1A5 Load Center/Battery Charger drawer fuses, 1A5-F1, 1A5-F2 and 1A5-F3, disabling the legacy charging circuits. The Load Center/Battery charger drawer is also renamed the 1A5 "Load Center/Battery Monitor" drawer by DGPS-EC-001. Total battery voltage and current are still reported back to the DGPS Nationwide Control Station (NCS), via the existing integrated circuits, and will remain fully functional to the respective East Coast or West Coast NAVCEN DGPS Watchstander, monitoring all DGPS sites within their Area of Responsibility (AOR).

Each DGPS-EC-001 installation kit includes three Major Charge 48/20 chargers, manufactured by Interacter, an American business, for the Major Charge Company located in Canada. Interactor also makes the 48/20 charger with their own label. Both the Interacter and Major Charge chargers are interchangeable, with identical chassis, function and design (see Images 3 and 4), allowing for competitive advantage to the Coast Guard in replacement source and cost.

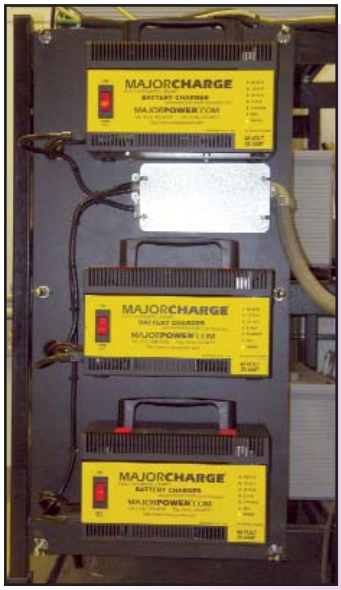


Image 1. Front view of chargers.

Image 2. Chargers, MK batteries and 3 shelf battery rack.

Image 3. Interacter 48/20 charger.

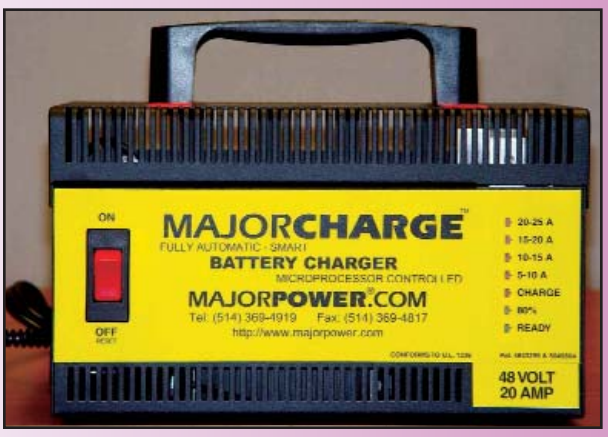


Image 4. Major Charge 48/20 charger.

The 48/20 battery chargers provide industrial strength, three stage, microprocessor controlled charging voltage/current to one shelf of four 12VDC batteries each (see Image 2), providing a temperature controlled automatically adjustable charging voltage between 55.2VDC to 56.4VDC per shelf, which equates to 13.8VDC and 14.1VDC per battery. The new charging system, therefore, provides dedicated charging current to its shelf of batteries, ignoring the long shelf-to-shelf connecting cable lengths that contribute to premature battery failure with the legacy charging system. Also, the new chargers are capable of charging lead-acid, gel-cel or the latest Absorbed Glass Mat (AGM) battery types, via a technician adjustable Battery Type Switch (BTS), a dip-switch, overcoming the legacy charging system's lead-acid only charging limitation.

The SC-1000 legacy integrated charging system is disabled by the permanent removal of its three fuses, as noted above. Also included in DGPS-EC-001 are instructions directing an Electronic Technician to "red-line" text, schematics and drawings within the SC-1000 technical manual, to indicate the non-operation and non-functionality of the legacy charging system circuits, once DGPS-EC-001 is installed. The legacy charging circuits will be permanently removed by a pending SC-1000 Field Change, to be implemented in Fiscal Year 2005, which will include delivery of a newly revised SC0-1000 technical manual also.

DGPS-EC-001 Installation Heads-Up

Sixty-eight battery charger kits have been produced by C2CEN, which will be delivered to applicable Electronic Systems Support Unit/Electronic Systems Support Detachments (ESU/ESDs), and to MLC managed DGPS maintenance contractors by fall 2004, or sooner, for installation. C2CEN's support staff have completed installation of DGPS-EC-001 at all Army Corps of Engineer (ACOE) Maritime DGPS sites. The installation kits include three Major Charge chargers, a charger mounting plate, one battery charger load center with circuit breakers and associated hardware.

Image 5. Technician drilling holes in battery rack.

Image 6. Installing Charger plate to rack.

Both MLC Pacific and Atlantic will coordinate distribution and installation with their respective ESU/ESDs and DGPS maintenance contractors. Also, both MLCs will coordinate acquiring the services of an electrician to install the conduit and power cabling between the DGPS equipment shelter; main distribution panel, the provided battery charger load center and to the charger mounting plate (see Figures 1 and 2).

The electrician will provide and install rigid and liquidtight flexible metal conduit, or they may install all liquidtight flexible metal conduit throughout the whole external battery charger system -- both conform to the NEC 2002 Electric Code. Image 7 shows the chargers installed with load center attached via liquidtight metal flexible conduit. The electrician will also provide a 50-amp double pole circuit breaker for installation in the main distribution power panel, providing AC power to the battery charger load center.

Average installation, by one or two technicians and one electrician, is

Figure 1.

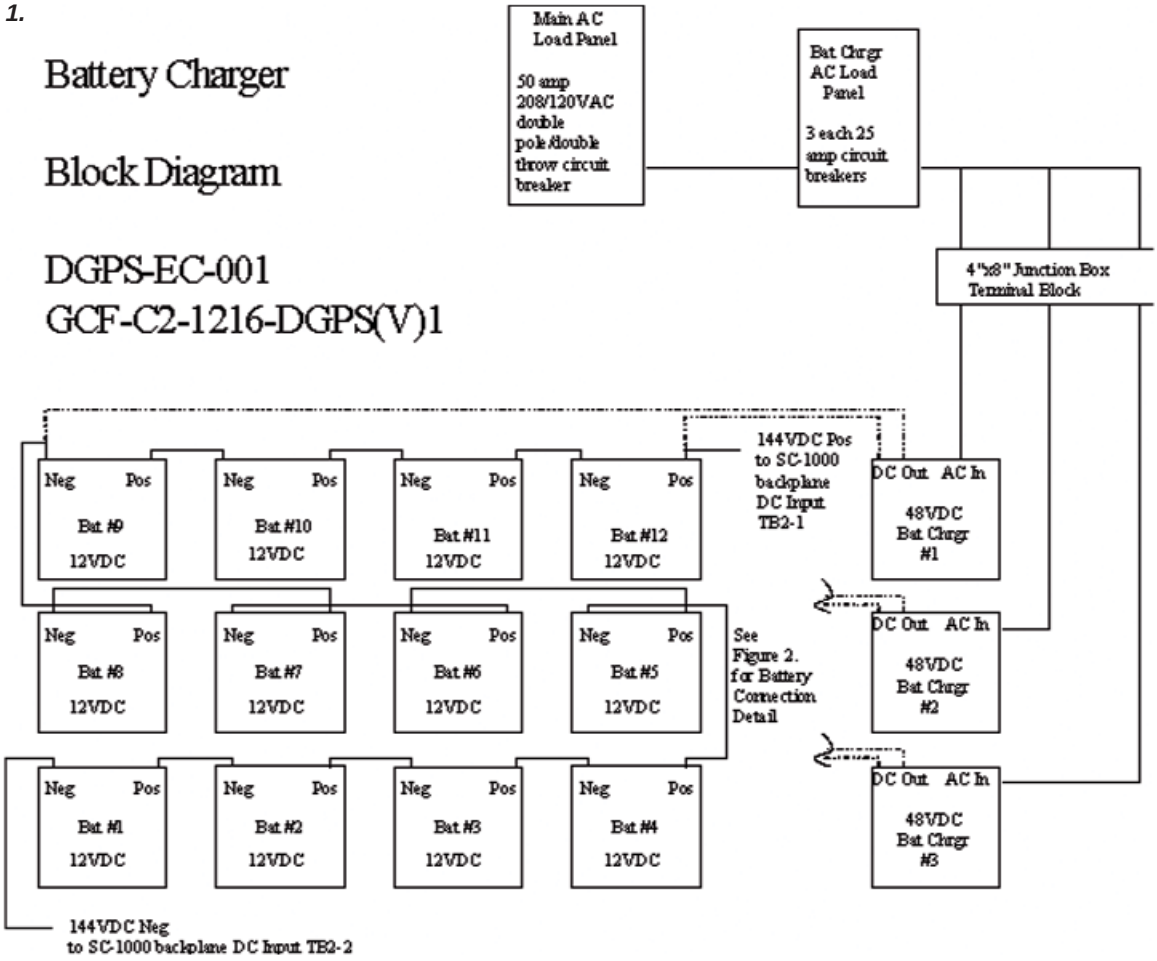
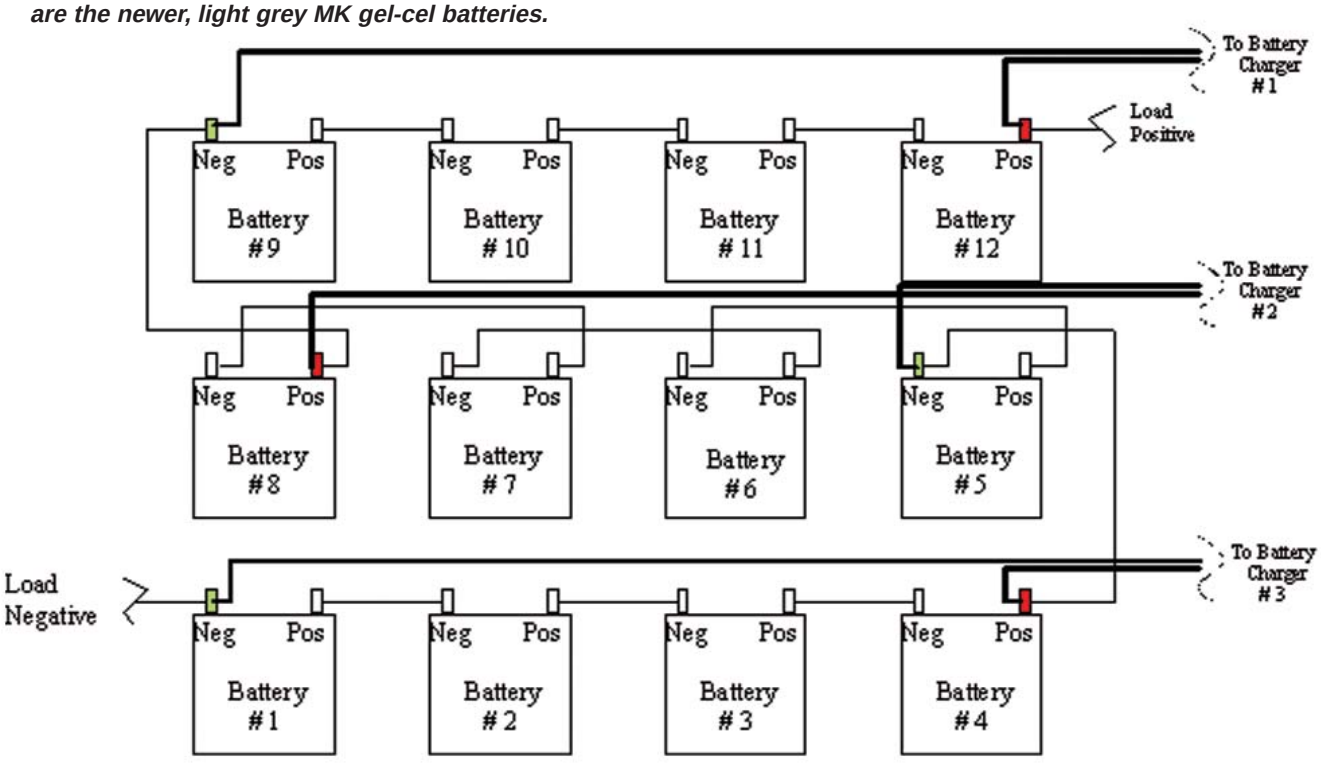


Figure 2. Connection detail assuming all batteries are the newer, light grey MK gel-cel batteries.



expected to take five hours. However, two seven-hour days have been suggested to accommodate repeat site visits as needed, to help facilitate long travel times to many sites. Once installed, DGPS-EC-001 is designed to be easily removed and re-installed by two technicians within 10 or 15 minutes to facilitate battery replacement. The liquidtight flexible metal conduit easily allows for routine plate removal and restoration during battery replacement operations. To remove the aluminum charger mounting plate from the battery rack: disconnect the charger DC output cables from the batteries; remove the power plugs from the chargers and the chargers from the mounting plates (see Images 7 and 8); remove the six wing nuts (see Image 9) that hold the charger mounting plate to the battery rack, followed by sliding the mounting plate off the six bolts and resting it against the bulkhead. Just follow the steps noted above in reverse order to re-install the mounting plate and chargers.

There are two types of gel-cel batteries in use throughout the Coast Guard's DGPS system. The original Exide Sonnenschein dark grey (Model name: "Dry Fit") batteries installed during Field Change 07 (circa 1998) are nearing the end of their useful life (see Image 10). DGPS-EC-001 does NOT replace all 12 batteries at every site. However, if the battery load test conducted during the pre-site survey indicates battery failure(s), technicians may contact MLCLANT (te-3), Mr. Michael Riley at (757) 628-4803, to coordinate battery replacement. Also, Maritime DGPS(V)1 sites with a four shelf battery rack (Image 10) need to be replaced with a three shelf battery rack. For servicing ESU/ESDs who report having a four shelf battery rack at their DGPS site, contact Mr. Riley to coordinate receipt of a three shelf battery rack. However, both the battery charger and the batteries are consumable items. ESU/ESDs shall replace failed batteries and or chargers with their unit funds. Replacement costs are typically less than $300.00 each, for either battery or charger. When replacing Exide batteries with the newer light grey MK batteries (see Image 2), pay attention to the reversed positive and negative battery terminal locations with each type of battery, this will require a one-time purchase and installation of new inter-connecting battery terminal cables. Note: care must be taken to install the battery charger DC output cables to the proper terminal posts with each type battery. Mixing Exide and MK battery types is functionally OKAY, but NOT recommended, because un-equal battery connecting cables will lead to premature battery failure, as noted above. Also, Exide batteries are near end of life anyway, so when replacing them, replace them all with MK batteries. After successfully installing DGPS-EC-001,

Image 7. Chargers with load center.

Image 8. Chargers hang on mounting bolts on plate.

Image 9. One of six mounting bolts with wingnuts.

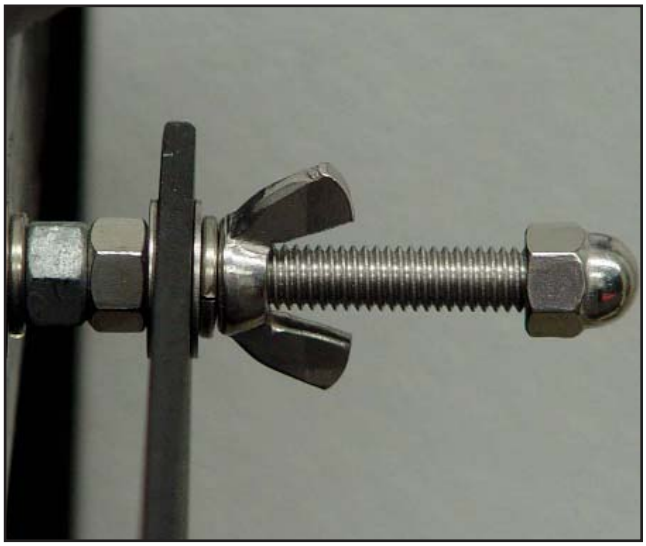


Image 10. Four Shelf rack w/Exide batteries.

ESU/ESDs shall locally dispose of any and all replaced failed batteries, following their established standard HAZ-MAT disposal processes. DGPS servicing maintenance contractors shall dispose of failed batteries as directed by their respective MLC Contracting Officer's Technical Representatives (COTR).

While gel-cel battery life is five years, the chargers are constructed for heavy-duty industrial applications, and are expected to perform for seven or more years.

The Major Charge 48/20 charging system is going to be a MAJOR relief to all Maritime DGPS(V)1 supporting technicians. Indeed, after receiving and installing their new charging system, DGPS-EC-001, technicians will be able to literally "Plug and Play, and Walk Away!"

Review of C2CEN's Systems Management and Engineering Facility (SMEF) Advisories DGPS-01-007 and DGPS-02-002, concerning Exide and MK battery replacement guidance is strongly encouraged. Note Mr. Mike Riley ((757) 628-4803) is the current MLCLANT (te-3) point of contact regarding DGPS system wide battery, battery cable and battery rack replacements. Also, by the time this article is printed, a new MLCLANT (te-3) DGPS system wide battery replacement contract will be under negotiation.

Please visit C2CEN's internet: http://www.uscg.mil/hq/c2cen/ and intranet: http://cgweb.lant.uscg.mil/c2cen/index.htm Web sites for access to SMEF Advisories, Tech Notes and other DGPS related information. Servicing technicians may contact C2CEN's DGPS Support SMEF Desk at (757) 686-2156 for technical phone assistance. Report DGPS related equipment casualties to the Raytheon Technical Services Corporation (RTSC) Help Desk at (757) 246-3477, as per C2CEN SMEF Advisory 04-001. Questions concerning C2CEN DGPS SMEF support functions should be directed to CWO Paul Gingras at (757) 686-4258 (pgingras@c2cen.uscg.mil). For DGPS-EC-001 engineering related questions please contact CWO Eric Shofner at (757) 686-4171 (eshofner@c2cen.uscg.mil).

About the Author

CWO3 Eric Shofner is a 25 year Active Duty Coast Guardsman currently working with the Engineering Hardware Land-based DGPS Radio Frequency Navigation section at C2CEN. CWO3 Shofner has six years of experience in the DGPS specialty, four years at C2CEN, and two years as Supervisor of ESD Oxnard, servicing the then Point Arguello DGPS(V)1 Maritime site (since moved to Lompoc, CA). Previous tours of duty include: COMMSTA Kodiak (two tours), CAMPSAC Point Reyes, USCGC JARVIS/RUSH, ESD Seattle, VTS Puget Sound, Group Humboldt and USCGC CAPE SMALL.

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